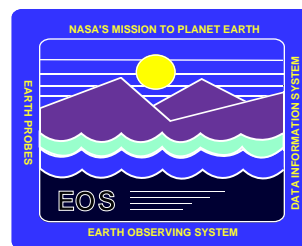


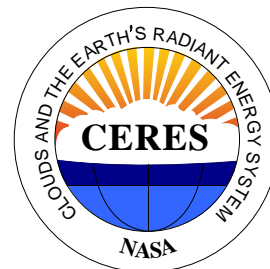
National Aeronautics and
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Hampton, Virginia 23681-2199



Clouds and the Earth's Radiant Energy System (CERES) Data Management System

View HDF User's Guide

Version 3.0
September 2001



**Clouds and the Earth's Radiant Energy System
(CERES)**

Data Management System

View_Hdf User's Guide

Version 3.0

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 Introduction	1
2.0 Installation	2
3.0 How to Start	3
4.0 GUI Description	11
4.1 Main Menu	14
4.2 Select Function Menu	51
4.3 Plot Window Menu	71
5.0 Recognized Variable Names	82
6.0 Configuration File	86
7.0 Examples	88
8.0 References	95
9.0 List of Acronyms	96
10.0 Data Center/Data Access Information	97

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
Fig. 3-1. Main Menu	3
Fig. 3-2. File Menu	4
Fig. 3-3. Select File Window	4
Fig. 3-4. List SDS and Vdata Names	5
Fig. 3-5. SDS Range Input Window	6
Fig. 3-6. Import SDS	6
Fig. 3-7. Vdata Fields Window	7
Fig. 3-8. Vdata Field Range Window	7
Fig. 3-9. Import Vdata	8
Fig. 3-10. Select Function Menu	9
Fig. 3-11. Plot Window	10
Fig. 3-12. File Menu	10
Fig. 4-1. File Menu	14
Fig. 4-2. Select Vgroup Window	14
Fig. 4-3. ASCII File With Column Format	15
Fig. 4-4. Open ASCII File Window	15
Fig. 4-5. List Variable Names for ASCII File	16
Fig. 4-6. Data Parameters for ASCII File Window	17
Fig. 4-7. Example for Import ASCII Data Set	17
Fig. 4-8. Export List Submenu	18
Fig. 4-9. Add HDF Option Menu	18
Fig. 4-10. Select Start Record Window	19
Fig. 4-11. Change Preferences Window	19
Fig. 4-12. Get Editor Name Window	20
Fig. 4-13. Graphic Menu	21
Fig. 4-14. Select Variables Window	21
Fig. 4-15. Select Multiple Variables Window	21
Fig. 4-16. Select Graph Type Window	21
Fig. 4-17. Multiple Variables Plot	22
Fig. 4-18. Select X and Y Fields Window	22
Fig. 4-19. Select X, Y, and Z Fields Window	23
Fig. 4-20. X-Y-Z Plot	23
Fig. 4-21. Y1-Y2 Plot	24
Fig. 4-22. Scattered Data Set	25
Fig. 4-23. Scatter Contour Plot	25

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
Fig. 4-24. Compute Menu	26
Fig. 4-25. Select Operands Window	26
Fig. 4-26. Get Constant Value Window	26
Fig. 4-27. Get Variable Name Window	27
Fig. 4-28. Question for Displaying Plot	27
Fig. 4-29. Select Graph Style	27
Fig. 4-30. Extract Bits Window	28
Fig. 4-31. Select User Defined Module Window	29
Fig. 4-32. Number of Output parameters Window	29
Fig. 4-33. Get Output Variable Name Window	29
Fig. 4-34. Set Unit Value Window	30
Fig. 4-35. Select Input Parameter Window	30
Fig. 4-36. Enter Constant Value Window	30
Fig. 4-37. Select Reference Data Window	30
Fig. 4-38. Curve Fit Menu	31
Fig. 4-39. Select Polynomial Fit Parameter Window	31
Fig. 4-40. Curve Fit Output Options Window	31
Fig. 4-41. Output file for Polynomial Fit Result	32
Fig. 4-42. Polynomial Fit Result with Error Estimates	32
Fig. 4-43. Select Exponential Model Fit Parameter Window	33
Fig. 4-44. Colors Menu	34
Fig. 4-45. Select Color Table	34
Fig. 4-46. Edit Color Map	35
Fig. 4-47. Edit Color Cell Window	35
Fig. 4-48. New Color Table Name Window	36
Fig. 4-49. Enter Background Color window	36
Fig. 4-50. Enter Foreground Color window	36
Fig. 4-51. Axis Menu	36
Fig. 4-52. Axis-Manual Submenu	37
Fig. 4-53. Set X Axis Range Window	37
Fig. 4-54. Set X and Y Axes Ranges Window	37
Fig. 4-55. Set X, Y, and Z Axes Ranges Window	37
Fig. 4-56. Axis-Grid Submenu	38
Fig. 4-57. 2D plot with XY grid	38
Fig. 4-58. Axis-Logarithmic Axis Submenu	39

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
Fig. 4-59. Style Menu	39
Fig. 4-60. Style-Line Type Submenu	39
Fig. 4-61. Style-Symbol Submenu	40
Fig. 4-62. Style-Symbol With Line Submenu	40
Fig. 4-63. Symbol Size Window	40
Fig. 4-64. Settings Menu	41
Fig. 4-65. Axis Settings Window	41
Fig. 4-66. Map Settings Window	42
Fig. 4-67. Select Geolocated Parameters Window	43
Fig. 4-68. Grid Start Setting Window	44
Fig. 4-69. Color Bar Setting Window	45
Fig. 4-70. Style Setting Window	45
Fig. 4-71. Define Fill Data Window	46
Fig. 4-72. Display Time Type Setting Window	46
Fig. 4-73. Auto Select Scale Factors Setting Window	46
Fig. 4-74. Help Menu	46
Fig. 4-75. About view_hdf Window	47
Fig. 4-76. Time Range Input Window	48
Fig. 4-77. Display Data Attributes	49
Fig. 4-78. Select Function Menu	50
Fig. 4-79. Output Action Window	50
Fig. 4-80. 3D Surface graph	51
Fig. 4-81. Question for Displaying Next Plot	52
Fig. 4-82. Grid Cell Plot	53
Fig. 4-83. Get Region Number Variable	53
Fig. 4-84. Enter Filename Window	54
Fig. 4-85. Display Statistics Result	54
Fig. 4-86. Mean and Standard Deviation Plot	55
Fig. 4-87. Statistics Parameters in Current Subsets	56
Fig. 4-88. Statistics For Whole Subset Result	56
Fig. 4-89. Histogram Parameters Window	57
Fig. 4-90. Question for Writing Result to a File	57
Fig. 4-91. Histogram Result	57
Fig. 4-92. Histogram Result Plot	58
Fig. 4-93. Select X Field Window	58

Fig. 4-94.	X Field List	58
Fig. 4-95.	Select X and Y Field Window	59
Fig. 4-96.	Question for Getting Geolocated Parameters	59
Fig. 4-97.	Geolocated Plot	60
Fig. 4-98.	Contour Geolocated Plot	61
Fig. 4-99.	Get Criterion Window	61
Fig. 4-100.	Name of Subset Data	62
Fig. 4-101.	2D Plot with Criterion	63
Fig. 4-102.	Enter Subsample Dimensions Window	63
Fig. 4-103.	Select Independent Variable Window	64
Fig. 4-104.	Regression Fit Result	64
Fig. 4-105.	Regression Fit Plot	65
Fig. 4-106.	Browse Image Plot	66
Fig. 4-107.	Enter Number of Profile Window	66
Fig. 4-108.	Display Data	67
Fig. 4-109.	Display Data Attributes	67
Fig. 4-110.	Enter Export File Window	68
Fig. 4-111.	Change Data Type Window	68
Fig. 4-112.	Replace Data Value Window	69
Fig. 4-113.	Scale Equations Window	69
Fig. 4-114.	Select Location of Scale and Offset Window	70
Fig. 4-115.	Select Scale and Offset from Other Source Window	70
Fig. 4-116.	Select Scale and Offset from Attribute Window	70
Fig. 4-117.	Input Scale and Offset Window	71
Fig. 4-118.	File Menu	71
Fig. 4-119.	Enter Postscript File Name Window	72
Fig. 4-120.	Enter Number of Frames Window	72
Fig. 4-121.	Select Printer Window	73
Fig. 4-122.	Select Viewgraph Printer Window	73
Fig. 4-123.	Enter Print Viewgraph Command Window	74
Fig. 4-124.	Graphic Menu	74
Fig. 4-125.	Subset Menu	75
Fig. 4-126.	Display individual profile from browse image plot	76
Fig. 4-127.	Select Subset Region	77
Fig. 4-128.	Subset View Menu	77
Fig. 4-129.	Select Region Plot	78
Fig. 4-130.	Show Subset Menu Window	78
Fig. 4-131.	Show Subset Plot	79

Fig. 4-132.	Add Text Window 1	79
Fig. 4-133.	Add Text Window 2	80
Fig. 4-134.	Adding Text on a Plot	80
Fig. 4-135.	Subset View Size Window	81
Fig. 4-136.	3D Rotation Window	81
Fig. 7-1.	Total Filtered Radiances for Night Time	88
Fig. 7-2.	Scene ID with 13 Levels	89
Fig. 7-3.	Extract Bits Window	90
Fig. 7-4.	Extract Elevation Scan Plane Flag	91
Fig. 7-5.	2D Plot for Elevation Scan Plane Flag	92
Fig. 7-6.	Geolocated plot for two data sets from two different files	93

LIST OF TABLES

<u>Table</u>		<u>Page</u>
Table 4-1.	Main Menu Functions and Buttons	11
Table 4-2.	Graph Style Menu	11
Table 4-3.	Plot Window Menu	13
Table 6-1.	Configuration File Settings	86
Table 10-1.	view_hdf Document Information	98

1.0 Introduction

NASA has ongoing long term studies to increase the understanding of the Earth's climate and environment. As part of these studies, NASA Langley Research Center (LaRC) has developed the Clouds and the Earth's Radiant Energy System (CERES) instrument to fly on multiple satellite platforms. The CERES Data Management System has been developed by the Atmospheric Sciences Competency to generate science data products from the instrument measurements. This system is now operational at the Langley Atmospheric Sciences Data Center (ASDC) producing archival data sets written in Hierarchical Data Format (HDF4).

To help access data from HDF products, a visualization and analysis tool (`view_hdf`) has been written in Interactive Data Language (IDL) using a graphical user interface (GUI) to manipulate the data. The `view_hdf` tool can select and subset variables from either Science Data Sets (SDS) or `vdata` structures in an HDF4 file, render both two and three dimensional graphics, and plot geolocated data onto various world map projections. Other features include multiple variable plots, difference plots, and simple statistics. Plots can be saved in PostScript, encapsulated PostScript, GIF, PNG, or MPEG formats or sent directly to a printer. Filtered subsets and statistical results can be written to a file in ASCII format for use in other analysis programs.

Examples presented in this document include results from the CERES instrument recently launched on the TRMM and Terra satellites. Although developed mainly for the CERES project, this tool may be of more general use for other data sets written in HDF4.

The tool was developed on a UNIX platform and has been transported to Sun and SGI workstations. It should be portable to any platform which supports IDL, the HDF4 libraries, and a C compiler.

Dr. Kam-Pui Lee of Science Applications International Corporation (SAIC) is a major author of the `view_hdf` tool and continues to add new features. Ms. Sharon L. Gibson and Mr. Larry E. Matthias of SAIC contributed to earlier development work on this tool.

2.0 Installation

The view_hdf tool is obtained from the compressed tar file, view_hdf.tar.gz. The file is first uncompressed with the command:

```
gunzip view_hdf.tar
```

view_hdf is extracted from the resulting tar file using the command:

```
tar xfv view_hdf.tar
```

The requirements for using the view_hdf tool include Interactive Data Language (IDL) with version 5.1 or above (URL = <http://www.rsinc.com>) and a UNIX platform operating system. The view_hdf tool includes six IDL programs: view_hdf.pro, getinfo.pro, getinfo1.pro, getinfoa.pro, getinfosds.pro, and getinfovd.pro; a shared library, ies_bds_rel2.so; and a color table file, view_hdf_color.tbl. If view_hdf is used to look at any CERES Bi-Directional Scans (BDS) file, the Digital_Location.file, which lists the names of Raw Instrument Status Data, and the Analog_Location.file, which lists the positions of engineering measurement data, are also needed.

The view_hdf tool has been ported to several platforms, including SGI, HP, Sun, and DEC Alpha. Delivery packages have been developed for each of these platforms.

The shared library included in the delivery package, ies_bds_rel2.so, is generated from the C programs ies_bds.c, get_digital_data.c, and HDF_Interface.h, on the designated computer platform and operating system. For other operating systems, the compile and ld options need to be modified in the Makefile to build a system-specific shared library. Three environment variables must be defined, HDFINC, HDFLIB, and HDFLIBS, before compiling the C programs by using the “make” command. HDFINC defines the path of the include directory of HDF; HDFLIB defines the path of HDF library files; and HDFLIBS lists the names of HDF libraries. For example,

```
setenv HDFINC /usr/local/HDF4.1r3/include  
setenv HDFLIB /usr/local/HDF4.1r3/lib  
setenv HDFLIBS -lmfhdf -ldf -ljpeg -lz
```

It should be pointed out that the compile and ld options for IDL version 5.2 and above use **-n32** instead of **-32** in the commands. The shared library included uses the **-32** option. The shared library may not be needed if IDL version 5.2 or above is used and the data file is not a BDS file.

The examples included in this guide use the CERES BDS, IES, ES8, ES4, and SSF Hierarchical Data Format (HDF4) science archival products. For a description of these datasets, see the BDS Collection Guide ([Ref. 1](#)), the ES8 Collection Guide ([Ref. 2](#)), or the CERES Data Product Catalog ([Ref. 3](#)). For further information on HDF, see the HDF User's Guide ([Ref. 4](#)).

3.0 How to Start

The view_hdf tool is developed with a graphical user interface (GUI). Before starting the GUI in the directory where the view_hdf files reside, start IDL by entering **idl** at the system prompt. IDL will show a prompt with the string “IDL>”. At the IDL prompt, type **view_hdf** or **view_hdf, max_color=n**, where n is an integer less than 256. The first command sets the number of colors to a default value of 200, and the second command sets the number of colors to any specified value which is less than 256. The main menu, as shown in Fig. 3-1, pops up on the screen. The GUI is described in Section 4.0.

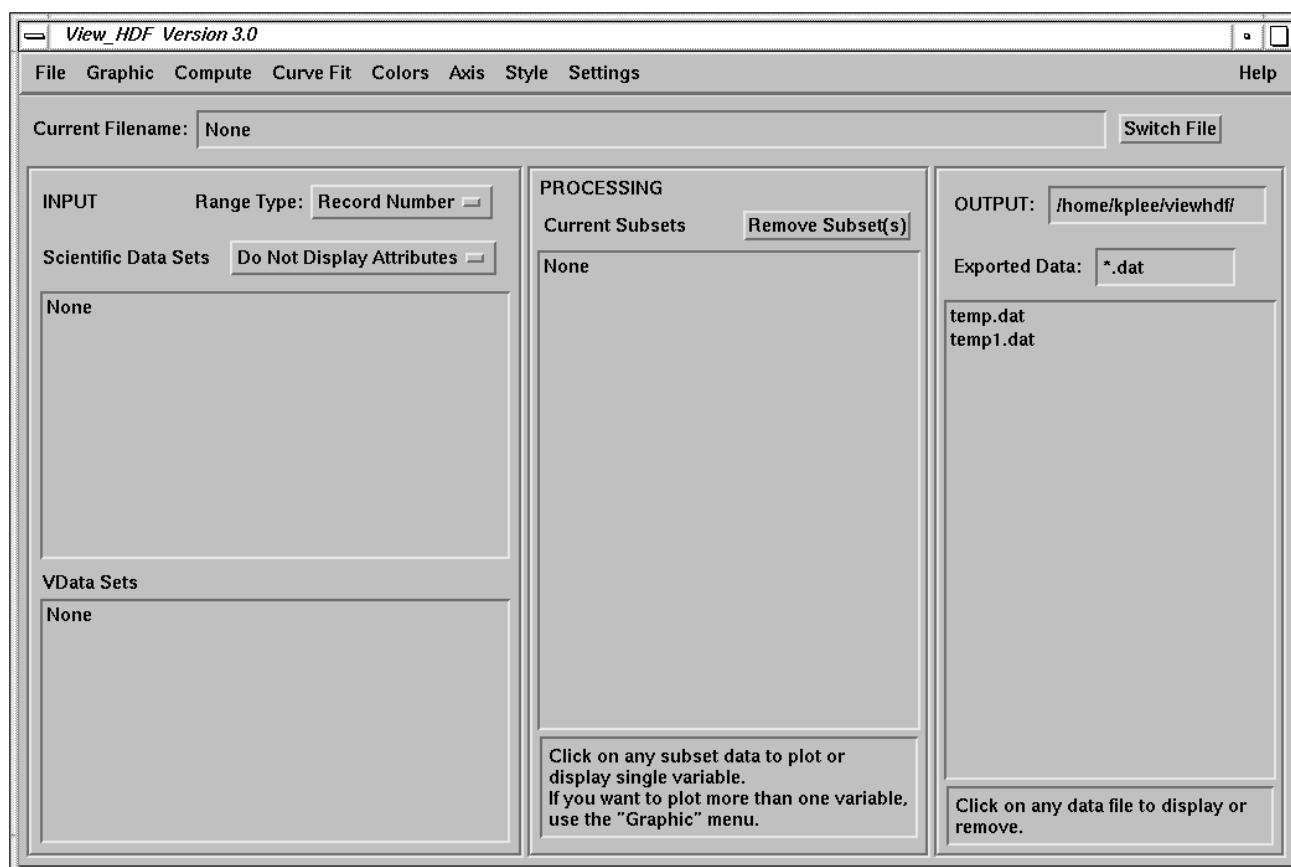


Fig. 3-1. Main Menu

The following procedure is used to select an HDF file:

Step 1: Select “File”. A pulldown menu pops up to display selections, as shown in [Fig. 3-2](#).



Fig. 3-2. File Menu

Step 2: Select “Open HDF Files”. This option displays on the Main Menu the names of all Science Data Sets (SDS) and Vdata in the HDF file. After selecting this option, a Select File window pops up, as shown in [Fig. 3-3](#).

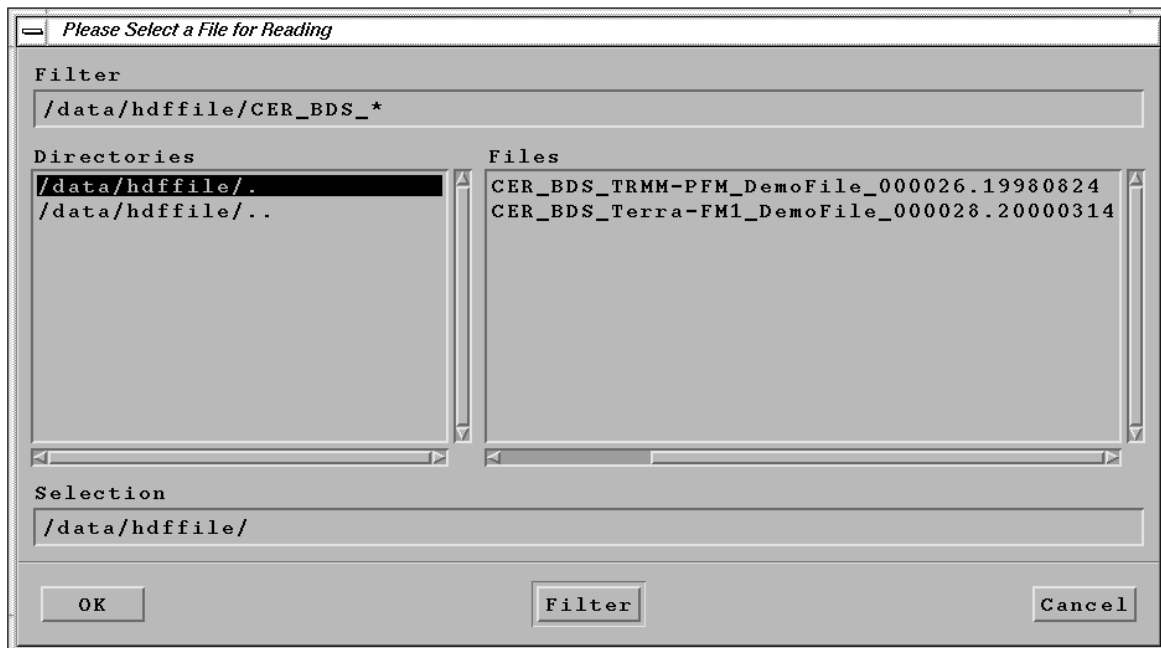


Fig. 3-3. Select File Window

Step 3: From the Select File window, select the file and click the “OK” button. The “Filter” button is used to refine the list of file names displayed. The filter can be edited in the filter area; for example from [Fig. 3-3](#), the “CER_BDS_*” is added to select any files that begin with “CER_BDS_”. Only files starting with this pattern show in the Files area.

After a file is selected, view_hdf opens the HDF file, searches for the names of all the SDS and Vdata structures, and lists them in the SDS and Vdata data sets areas, respectively, as shown in Fig. 3-4.

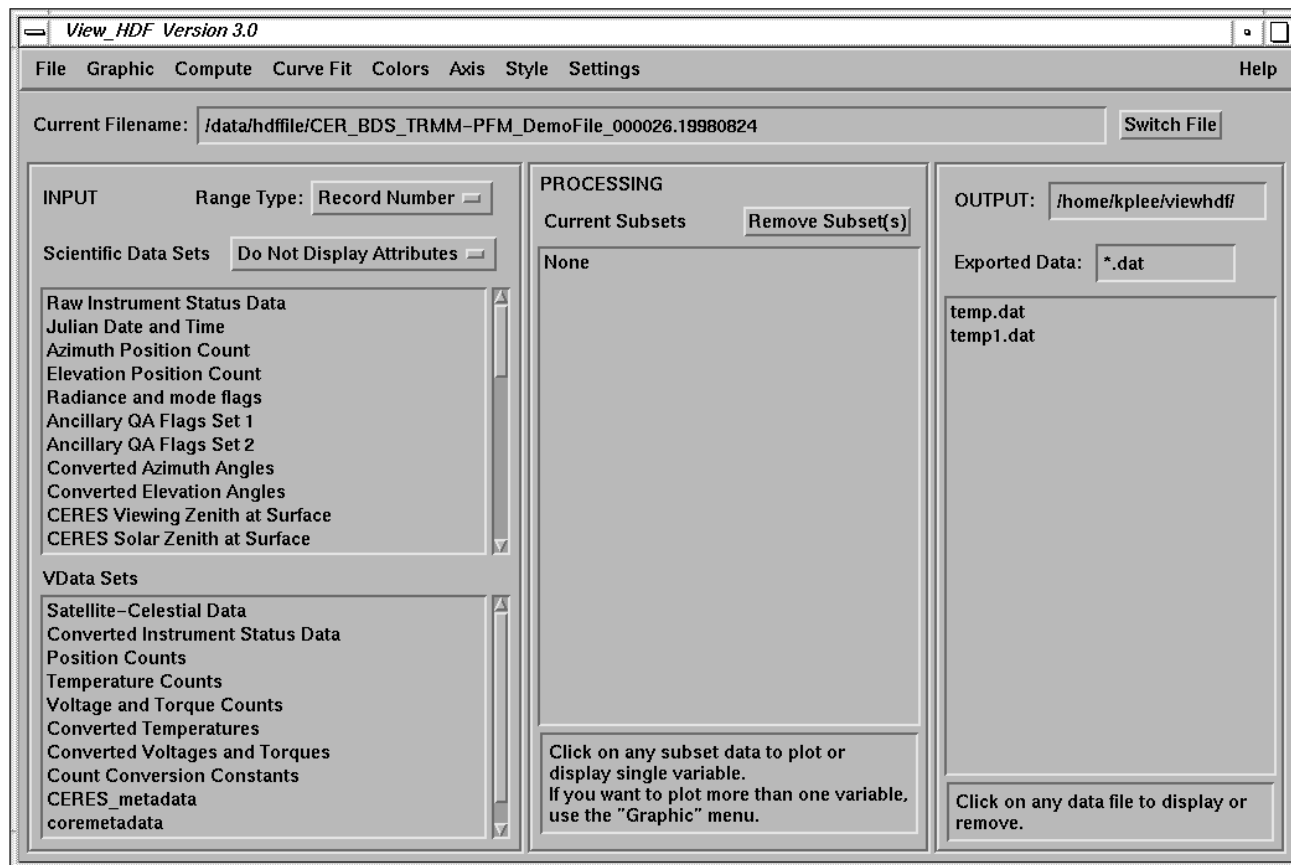
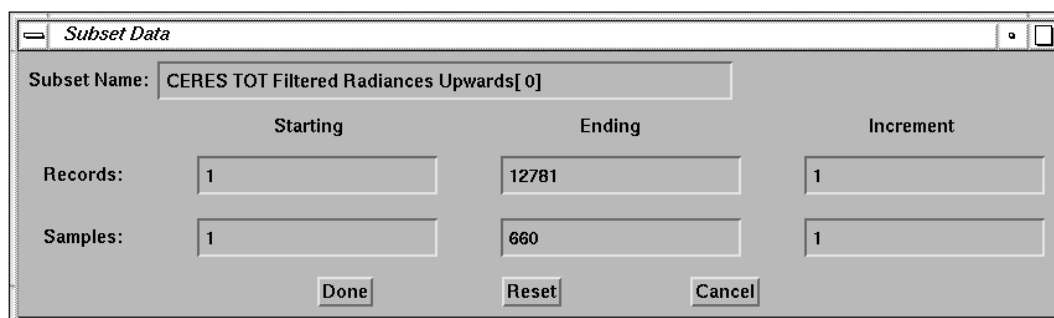


Fig. 3-4. List SDS and Vdata Names

Before any data can be accessed, the data must be imported to the Current Subsets area. For an SDS, the procedure is:

Step 1: Select a SDS. Click on the desired SDS to import from the Scientific Data Sets area. For example, select “CERES TOT Filtered Radiances Upwards”. A Subset Data window, as shown in Fig. 3-5, pops up with Starting, Ending, and Increment fields for each dimension of the SDS array.

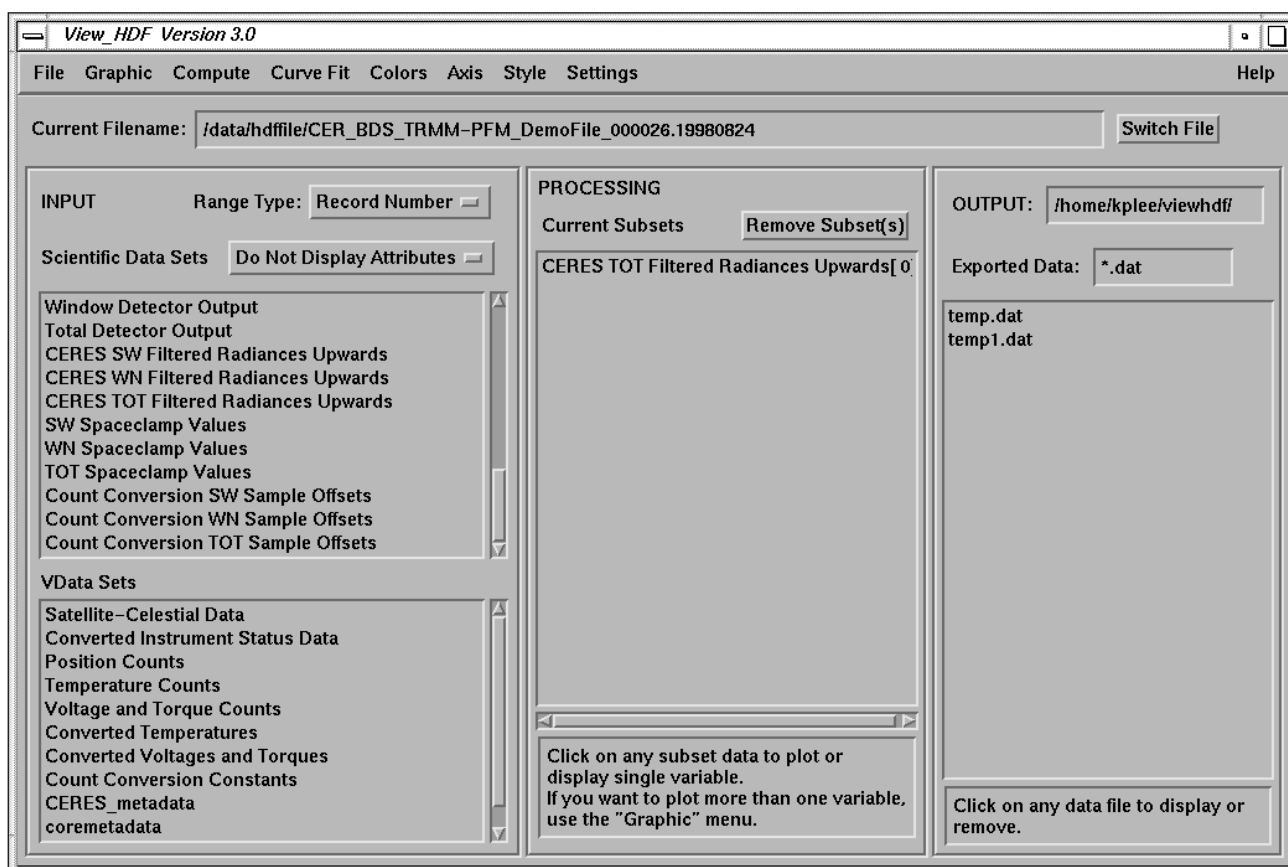
A range of data can then be selected to import. The Increment field can be used to selectively subset each dimension.



The 'Subset Data' dialog box is shown. It has a title bar with a minus sign, a maximize button, and a close button. The 'Subset Name' field contains 'CERES TOT Filtered Radiances Upwards[0]'. Below this, there are three columns: 'Starting', 'Ending', and 'Increment'. Under 'Starting', the 'Records' field has '1' and the 'Samples' field has '1'. Under 'Ending', the 'Records' field has '12781' and the 'Samples' field has '660'. Under 'Increment', both 'Records' and 'Samples' fields have '1'. At the bottom, there are three buttons: 'Done', 'Reset', and 'Cancel'.

Fig. 3-5. SDS Range Input Window

Step 2: Input ranges. Input the range for data importing. For this example, the first dimension is for the number of records, and the second is the number of samples in each record. An increment integer n^{th} record to be selected. After finishing the input, click the “Done” button. The data are imported, and the SDS name will appear in the Current Subsets area, as shown in Fig. 3-6.



The 'View_HDF Version 3.0' main window is shown. It has a menu bar with 'File', 'Graphic', 'Compute', 'Curve Fit', 'Colors', 'Axis', 'Style', 'Settings', and 'Help'. The 'Current Filename' field contains '/data/hdf/hdf/CER_BDS_TRMM-PFM_DemoFile_000026.19980824' and there is a 'Switch File' button. The window is divided into three main panels. The left panel is titled 'INPUT' and has a 'Range Type' dropdown set to 'Record Number' and a 'Scientific Data Sets' dropdown set to 'Do Not Display Attributes'. It contains two lists: 'Window Detector Output' (Total Detector Output, CERES SW Filtered Radiances Upwards, CERES WN Filtered Radiances Upwards, CERES TOT Filtered Radiances Upwards, SW Spaceclamp Values, WN Spaceclamp Values, TOT Spaceclamp Values, Count Conversion SW Sample Offsets, Count Conversion WN Sample Offsets, Count Conversion TOT Sample Offsets) and 'VData Sets' (Satellite-Celestial Data, Converted Instrument Status Data, Position Counts, Temperature Counts, Voltage and Torque Counts, Converted Temperatures, Converted Voltages and Torques, Count Conversion Constants, CERES_metadata, coremetadata). The middle panel is titled 'PROCESSING' and has a 'Current Subsets' list containing 'CERES TOT Filtered Radiances Upwards[0]' and a 'Remove Subset(s)' button. Below this list is a note: 'Click on any subset data to plot or display single variable. If you want to plot more than one variable, use the "Graphic" menu.' The right panel is titled 'OUTPUT' and has an 'OUTPUT:' field containing '/home/kplee/viewhdf/' and an 'Exported Data:' field containing '*.dat'. Below these are two lists: 'temp.dat' and 'temp1.dat'. At the bottom of the right panel is a note: 'Click on any data file to display or remove.'

Fig. 3-6. Import SDS

The selected data range will be remembered so that this range will be shown on the next SDS Range Input Window. Click on the “Reset” button in this window to reset the range of data.

For importing a Vdata, the procedure is slightly different from an SDS because the fields in each Vdata are selected individually. The procedure is:

Step 1: Select Vdata. Click on the desired Vdata set to import from the Vdata Sets area. For example, select “Converted Temperatures”. A Select Vdata Fields window, which lists all the fields under this Vdata, pops up, as shown in [Fig. 3-7](#).

Step 2: Select field. Select the field from the window by clicking the button next to the field name. For example, select “WN Blackbody Temperature”. A Subset Data window, as shown in [Fig. 3-8](#), pops up with Starting, Ending, and Increment fields. A range of record numbers can then be selected to import. The Increment field can be used to selectively subset by record number. The second dimension is for the order of the field.

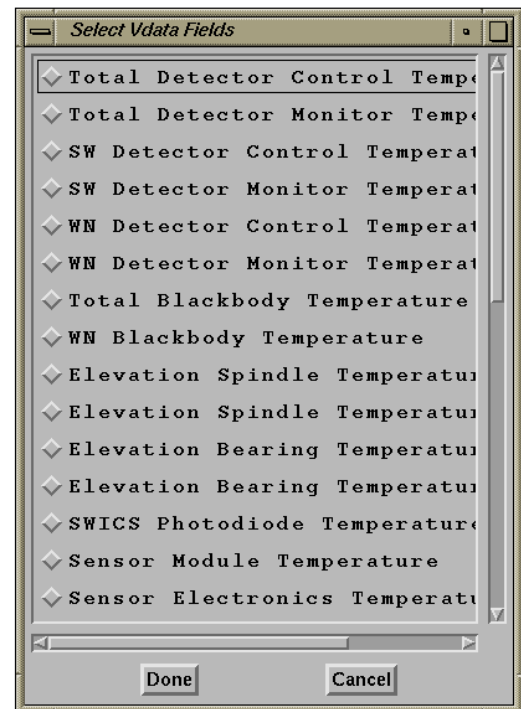


Fig. 3-7. Vdata Fields Window

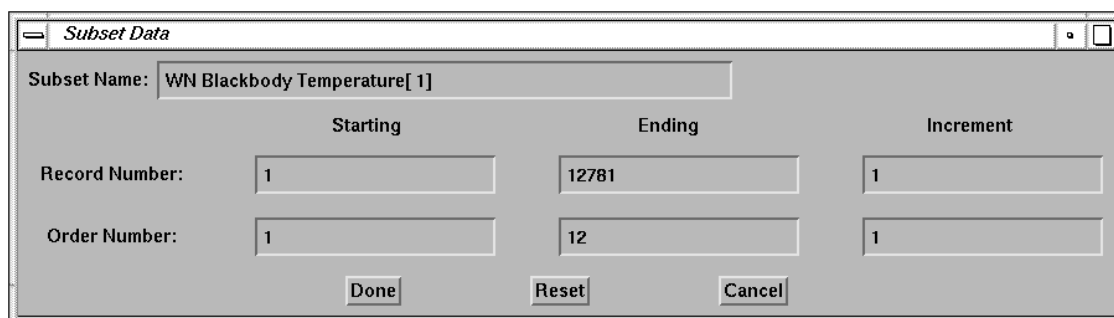


Fig. 3-8. Vdata Field Range Window

Step 3: Input ranges. Input the start and end record numbers and the increment value for data importing. After finishing the input, click the “Done” button. The data are imported, and the Vdata field name will show in the Current Subsets area, as shown in [Fig. 3-9](#).

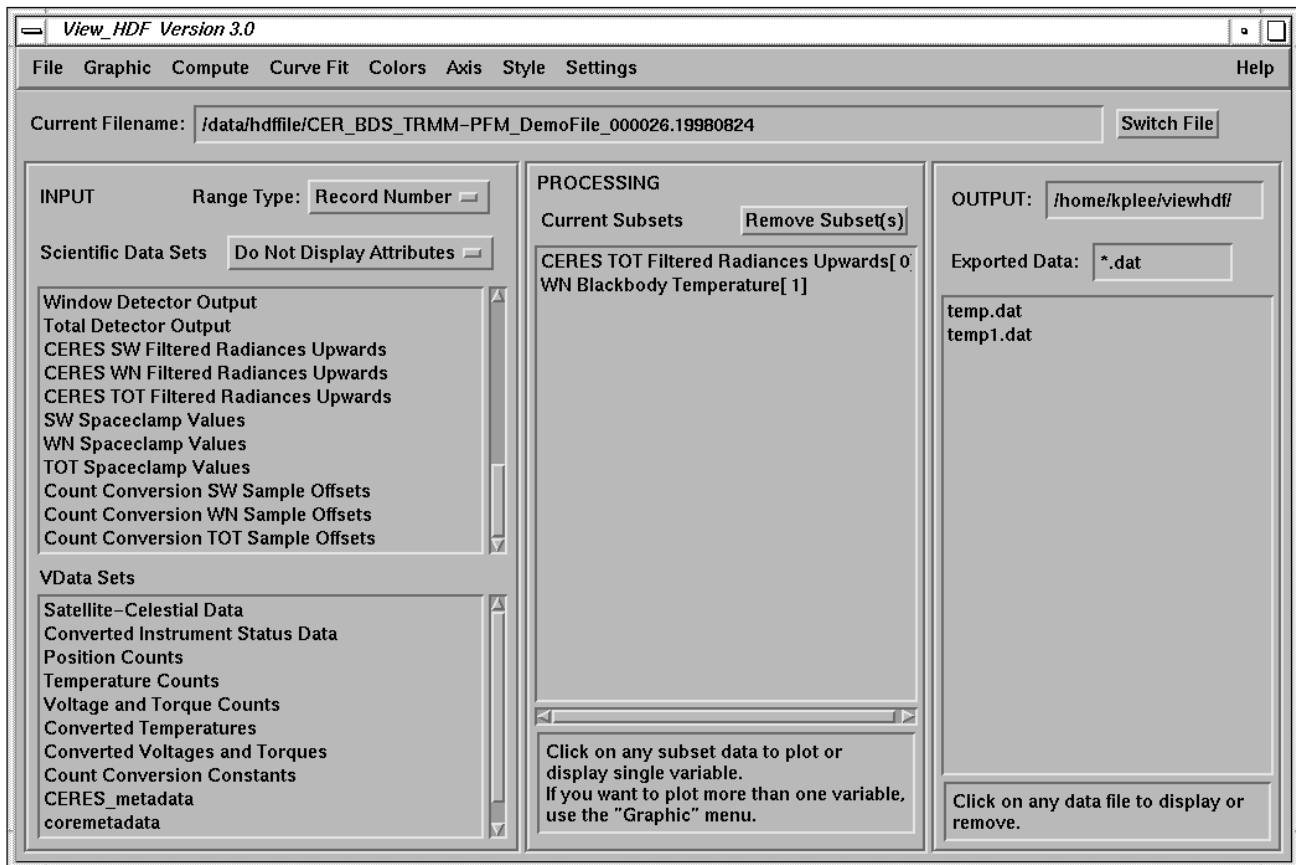


Fig. 3-9. Import Vdata

The selected data range will be remembered so that this range will be shown on the next Vdata Field Range Window. Click on the “Reset” button in this window to reset the range of data.

After the data are imported, click on the name of the data in the Current Subsets to access that data.

Clicking on the name in the Current Subsets area automatically pops up the function menu, as shown in [Fig. 3-10](#). Select a function option. For example, select a “2D Graph” and click the “Done” button. A window with the plot pops up on the screen, as shown in [Fig. 3-11](#).

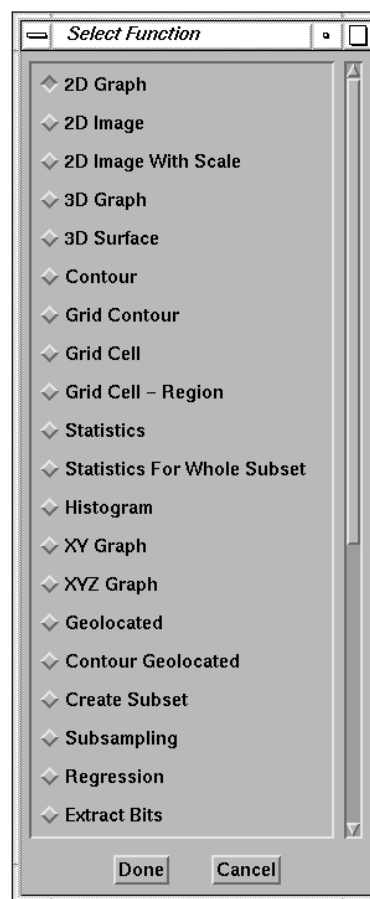


Fig. 3-10. Select Function Menu

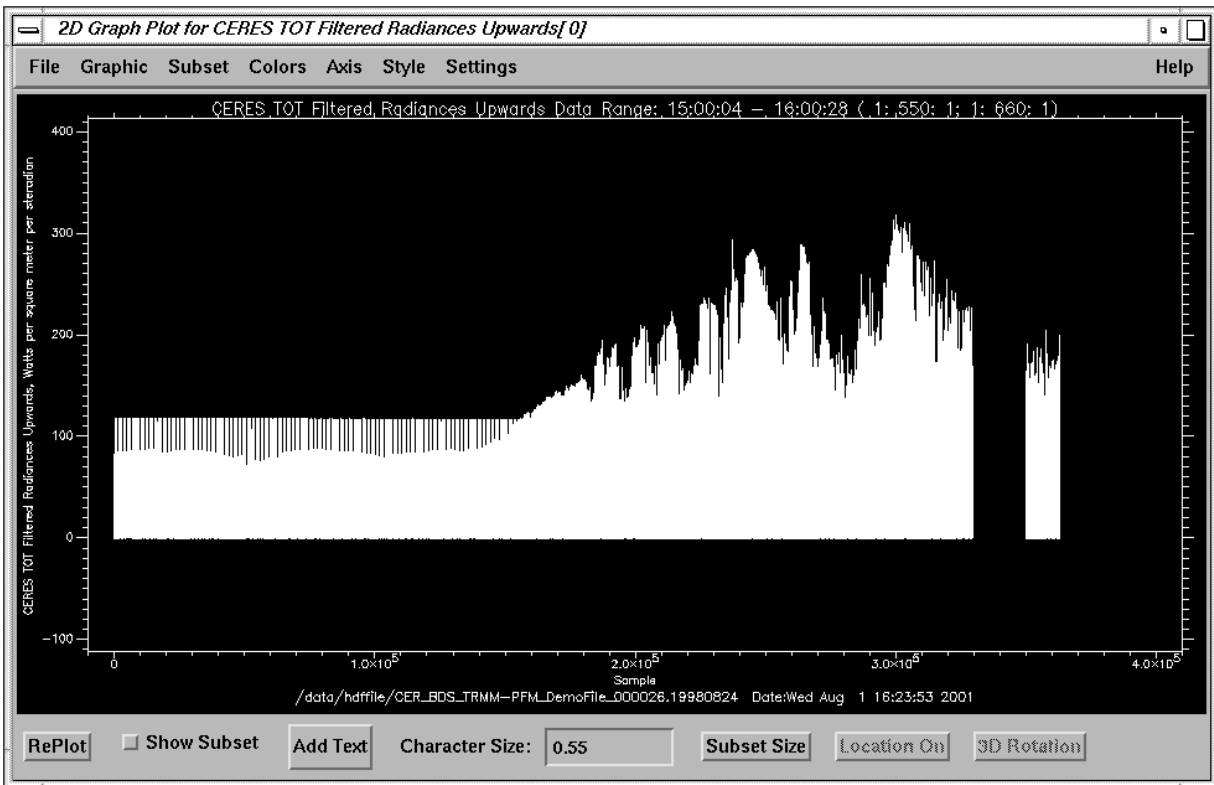


Fig. 3-11. Plot Window

The plot can now be saved as a Postscript or GIF file, or sent directly to a printer by clicking the “File” menu on the plot window. A pulldown menu, as shown in Fig. 3-12, pops up to display the options. The plot window can be closed by selecting the “Close” option in the pulldown menu. Note: more than one plot window can be manipulated in the same session. To select the current working window, move the cursor on the desired plot window.

To exit view_hdf, click on the “File” menu in Main Menu and select the “Exit” option. All the IDL windows will be closed, and the IDL prompt will reappear. At the IDL prompt, type **exit** to exit IDL.

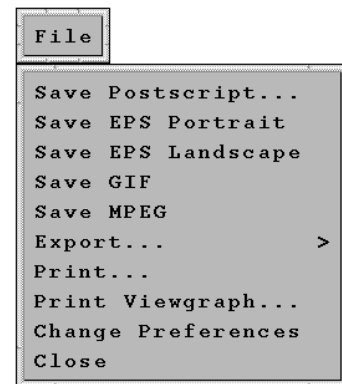


Fig. 3-12. File Menu

4.0 GUI Description

This section briefly describes different menus, functions, and buttons on the GUI. [Table 4-1](#) lists all the functions and buttons available from the Main Menu, [Table 4-2](#) lists all the graphic functions, and [Table 4-3](#) lists all the functions and buttons available from the Plot Window. The Item Number column lists the functions and buttons with hyperlinks to descriptions of the items.

Table 4-1. Main Menu Functions and Buttons

Item Number	Menu and Button Description	Fig. Number
(1)	"File": Includes the options for opening a file, exporting data to a file, changing preferences settings, and exiting view_hdf.	Fig. 4-1
(2)	"Graphic": Plots more than one variable from the Current Subsets list.	Fig. 4-13
(3)	"Compute": Includes the options for doing simple arithmetic operations between two variables or between one variable and a constant, and extracting specific contiguous bits from an integer variable.	Fig. 4-24
(4)	"Curve Fit": Does curve fitting between two variables.	Fig. 4-38
(5)	"Colors": Includes the options for selecting different color tables, editing and saving the color map, and changing the background and foreground colors.	Fig. 4-44
(6)	"Axis": Includes the options for manual or automatic setting of the X, Y, and Z axes range. It also includes the options for using linear or logarithmic axis and producing grids.	Fig. 4-51
(7)	"Style": Includes the options for setting the line type, symbol type, and symbol size used to display the data.	Fig. 4-59
(8)	"Settings": Includes the options for setting axes ranges, map projection, location of first grid for "Grid Cell" plot, color bar, how to display data, fill data values, display time type, and how to select scale factor.	Fig. 4-64
(9)	"Help": Calls up this user guide or IDL on-line help menu.	Fig. 4-74
(10)	"Current Filename": Displays the name of current file.	
(11)	"Switch File": Switch the last five open files in the same session as current working file without opening it again.	
(12)	"INPUT": Displays the names of SDS and Vdata sets in the current HDF file.	Fig. 3-4
(13)	"PROCESSING": Displays the names of the imported data sets.	Fig. 3-6
(14)	"OUTPUT": Lists the names of the files that match the filter.	Fig. 3-9

Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(15)	"2D Graph": Plots data against the index of the data array.	Fig. 3-11
(16)	"2D Image": Displays data as an image.	

Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(17)	"2D Image With Scale": Interpolates the data set to fit the size of view window before displaying data as an image.	
(18)	"3D Graph": Draws a wire-mesh representation of a two-dimensional array projected into two dimensions.	
(19)	"3D Surface": Creates a shaded-surface representation of a gridded surface with shading from a light source model.	Fig. 4-80
(20)	"Contour": Draws a line contour plot from the data.	
(21)	"Grid Contour": Creates a filled contour plot on a map projection.	
(22)	"Grid Cell": Displays gridded data region by region on map projection.	Fig. 4-82
(23)	"Grid Cell - Region": This option is similar to "Grid Cell", (22), except the gridded data are arranged in terms of region number.	Fig. 4-83
(24)	"Statistics": Calculates the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays.	Fig. 4-86
(25)	"Statistics For Whole Subset": Calculate the mean, standard deviation, maximum, minimum and number of samples for a whole array.	Fig. 4-88
(26)	"Histogram: Does a sample histogram of data with an option to write the result to a file.	Fig. 4-89
(27)	"XY Graph": Displays data against time, sample number, record number, packet number, or variable selected from Current Subsets list.	
(28)	"XYZ Graph": Displays data (Z) against two variables (X,Y) from the Current Subsets list.	
(29)	"Geolocated": Displays data on map projection.	Fig. 4-97
(30)	"Contour Geolocated": Converts data into a two-dimensional regular grid and creates a filled contour plot on a map projection.	Fig. 4-98
(31)	"Create Subset": Creates a subset of the data based on the range of another criterion variable.	Fig. 4-101
(32)	"Subsampling": Subsets a data set already imported into Current Subsets list.	Fig. 4-102
(33)	"Regression": Does a multiple linear regression fit.	Fig. 4-103
(34)	"Extract Bits": Extracts specific contiguous bits from an integer variable.	
(35)	"Browse Image": Displays a two-dimensional data array with two one-dimensional arrays, X and Y variables.	Fig. 4-106
(36)	"Browse Image With Average": Does average for every number of profiles before creating a browse image.	Fig. 4-107
(37)	"Transpose": Transposes a two-dimensional data array.	
(38)	"Display Data": Displays data on an editor window.	Fig. 4-108
(39)	"Display Attribute": Displays the attributes of the data set on an editor window.	Fig. 4-109
(40)	"Export Data": Exports data to a file.	Fig. 4-110
(41)	"Export Data Without Filldata": Exports data to a file without fill data.	
(42)	"Change Name": Changes the name of a variable in the Current Subsets list.	

Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(43)	"Change Data Type": Changes the data type of a variable in the Current Subsets list.	Fig. 4-111
(44)	"Replace Data Value": Replaces a range of data values or any particular data value to an assigned value.	Fig. 4-112
(45)	"Scale Data Value": Scales data set with scale factor and offset value.	Fig. 4-113
(46)	"Remove": Removes the name of the variable from the Current Subsets list.	

Table 4-3. Plot Window Menu

Item Number	Menu and Button Description	Fig. Number
(47)	"File": This menu includes the options for saving the plot in Postscript, encapsulated Postscript, GIF, PNG, or MPEG format, exporting data to file, printing the plot, making viewgraphs, changing settings, and closing the plot window.	Fig. 4-118
(48)	"Graphic": Redisplays the data with a different type graphic. The user can use this menu to redisplay the data with a different style of graphic.	Fig. 4-124
(49)	"Subset": Zooms, locates or views a subset of a plot. This menu allows any particular portion of the plot to be viewed.	Fig. 4-125
(50)	"Colors": Selects color table, edit and save the color map, and changes the background and foreground colors.	
(51)	"Axis": Sets the ranges of the X, Y, and Z axes manual or automatically, use linear or logarithmic axis, or produces a grid.	
(52)	"Style": Sets the line type, symbol type, and symbol size to display data.	
(53)	"Settings": Includes the options for setting axes ranges, map projection, location of first grid for "Grid Cell" plot, color bar, how to display data, fill data values, display time type, how to select scale factor.	
(54)	"RePlot": Replots the graphic.	
(55)	"Show Subset": Varies the displayed subset.	
(56)	"Add Text": Adds text on the plot.	Fig. 4-132
(57)	"Character Size": Changes the character size on the plot window.	
(58)	"Subset Size": Resizes the subset plot window for "Select Region" with "Geolocated Plot" option.	Fig. 4-135
(59)	"Location On": Becomes activated if the "Locate" option in "Subset" menu is selected, see item 49(b).	
(60)	"3D Rotation": Sets the angles of rotation for "3D Graph" and "3D Surface".	Fig. 4-136

4.1 Main Menu

This section describes the menus, functions and buttons on the Main Menu (Fig. 3-1):

- (1) “File”: This menu includes the options for opening a file, exporting data to a file, changing preferences settings, and exiting view_hdf. The menu is shown in Fig. 4-1.



Fig. 4-1. File Menu

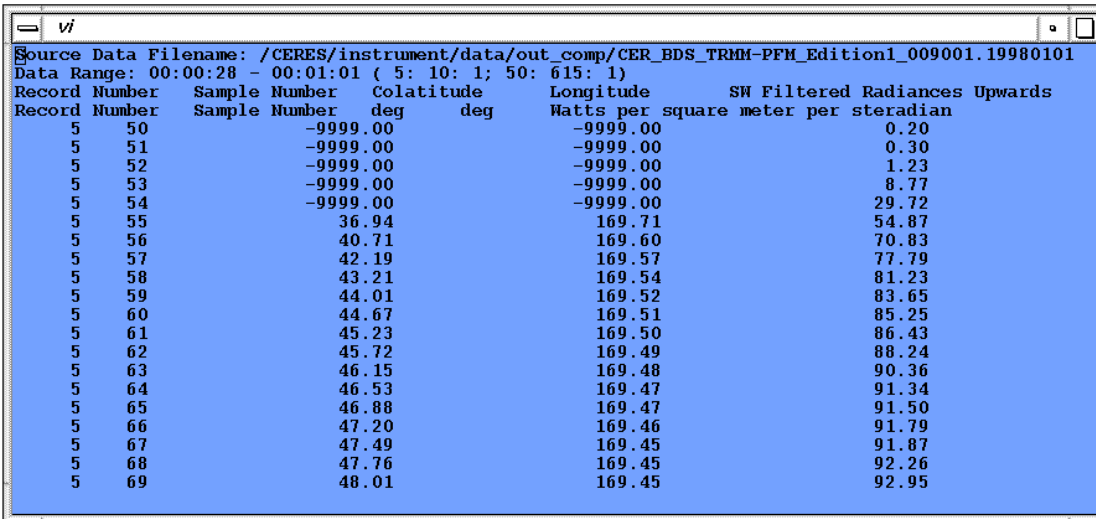
The options are:

- (a) “Open HDF Files”: Open an HDF file and display all the names of SDS and Vdata sets in the INPUT column on the Main Menu. If an HDF file is grouped with vgroups, a window, as shown in Fig. 4-2, pops up with all the names of vgroups inside the file. Click on any vgroup and another window similar to Fig. 4-2 will pop up if other vgroups are grouped under this vgroup; otherwise, all SDS and Vdata sets will be displayed in the INPUT column, see item (12).



Fig. 4-2. Select Vgroup Window

(b) “Open ASCII Files”: Open an ASCII data file with column format, as show in Fig. 4-3.

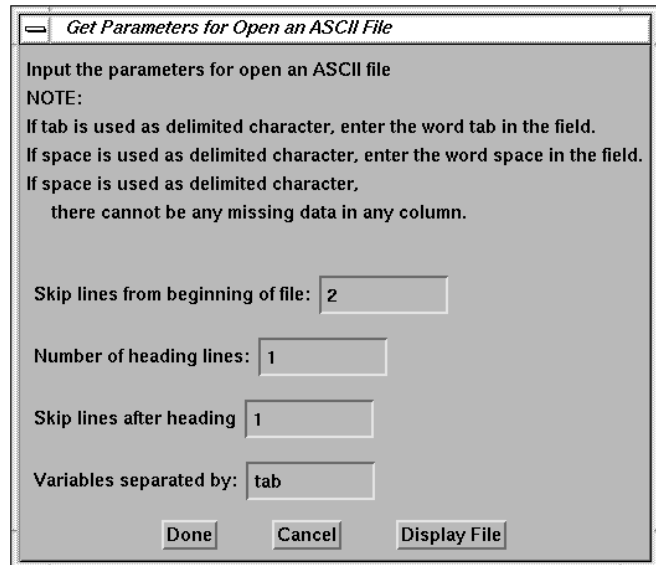


Record Number	Sample Number	Colatitude	Longitude	SW Filtered Radiances Upwards
Record Number	Sample Number	deg	deg	Watts per square meter per steradian
5	50	-9999.00	-9999.00	0.20
5	51	-9999.00	-9999.00	0.30
5	52	-9999.00	-9999.00	1.23
5	53	-9999.00	-9999.00	8.77
5	54	-9999.00	-9999.00	29.72
5	55	36.94	169.71	54.87
5	56	40.71	169.60	70.83
5	57	42.19	169.57	77.79
5	58	43.21	169.54	81.23
5	59	44.01	169.52	83.65
5	60	44.67	169.51	85.25
5	61	45.23	169.50	86.43
5	62	45.72	169.49	88.24
5	63	46.15	169.48	90.36
5	64	46.53	169.47	91.34
5	65	46.88	169.47	91.50
5	66	47.20	169.46	91.79
5	67	47.49	169.45	91.87
5	68	47.76	169.45	92.26
5	69	48.01	169.45	92.95

Fig. 4-3. ASCII File With Column Format

After selecting an ASCII file, a window, as shown in Fig. 4-4, pops up for entering parameters for opening the file. The parameters are:

- (i) “Skip lines from beginning of file”: Skip number of lines from the beginning of the file. The default value is 0. The value is set to 2 for the file shown in Fig. 4-3 to skip two lines.
- (ii) “Number of heading lines”: Set number of lines for variable names. The default is 1.
- (iii) “Skip lines after heading”: Skip number of lines after the line of variable names. The default is 0. The value is set to 1 for the above example to skip one line.
- (iv) “Variables separated by”: Set the character which separates the columns. The default is tab. If tab is used as delimited character, enter the word **tab** in the field. If space is used, enter the word **space** in the field. If space is used as delimited character, there cannot be any missing data in any column.



Get Parameters for Open an ASCII File

Input the parameters for open an ASCII file

NOTE:
If tab is used as delimited character, enter the word tab in the field.
If space is used as delimited character, enter the word space in the field.
If space is used as delimited character, there cannot be any missing data in any column.

Skip lines from beginning of file:

Number of heading lines:

Skip lines after heading:

Variables separated by:

Done Cancel Display File

Fig. 4-4. Open ASCII File Window

After entering all the parameters, click the “Done” button. The names of the variables will display in the SDS field of the main menu, as shown in [Fig. 4-5](#).

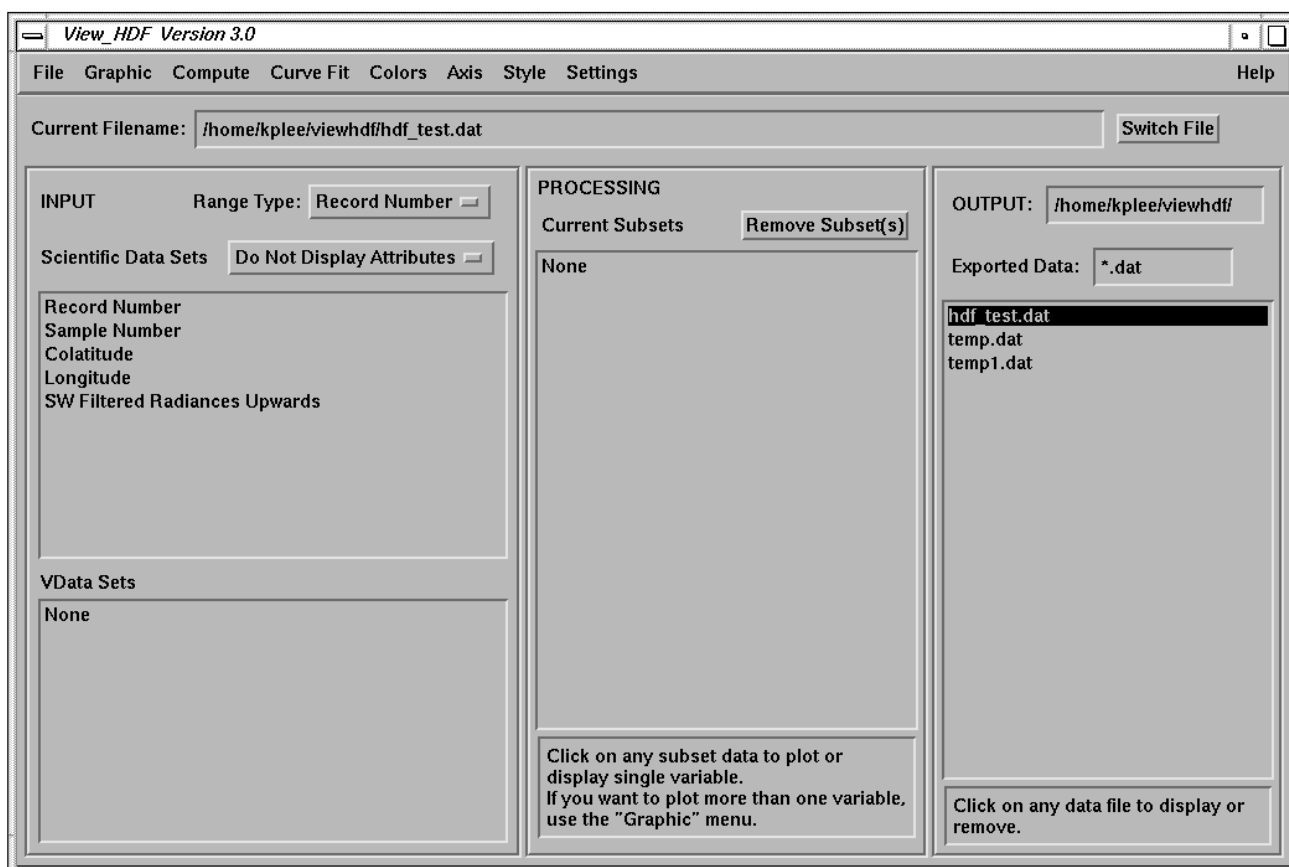


Fig. 4-5. List Variable Names for ASCII File

If the number of lines for variable names is set to 0, the default names, Variable_#, will be used where # is the sequence column in the file. The “Display File” button in the open ASCII file window allows the user to open the file in the specified editor to look at the data before entering the necessary parameters.

To select a particular variable, click on the variable name in the Scientific Data Sets area. A window, as shown in Fig. 4-6, will pop up for entering the parameters required for importing the data. These parameters are:

- (i) Name of the variable.
- (ii) Rank. The default is 1.
- (iii) Dimension size. The default is total number of data for this column.
- (iv) Unit. The unit of the variable.
- (v) Fill Value. The fill value used in this data set.

Get Name, Rank, Dimension Size, Units, Fill Value

Input the name, rank, dimension size, and units to store data
The MAX and MIN values of data are 168.410 and -0.230000
NOTE:
If rank is greater than 1, use "," to separate each dimension value.
If number of records is unknown, do not enter the first dimension value.

Name:

Rank:

Dimension Size:

Units:

Fill Value:

Fig. 4-6. Data Parameters for ASCII File Window

If the rank is set to greater than 1, enter the dimension size for each dimension separated by “,”. The order of the dimensions is same as one specifies in HDF file. If the first dimension is unknown, enter the other dimensions only. The first dimension will be calculated based on number of data records read. An example based on the file as shown in Fig. 4-3 is shown in Fig. 4-7. After entering all the parameters, click the “Done” button. A Subset Data window, as shown in Fig. 3-5, pops up for selecting the range of data to import to the Current Subsets list.

Get Name, Rank, Dimension Size, Units, Fill Value

Input the name, rank, dimension size, and units to store data
The MAX and MIN values of data are 168.410 and -0.230000
NOTE:
If rank is greater than 1, use "," to separate each dimension value.
If number of records is unknown, do not enter the first dimension value.

Name:

Rank:

Dimension Size:

Units:

Fill Value:

Fig. 4-7. Example for Import ASCII Data Set

- (c) “Open Previous Files”: The last five files opened will be remembered. A file can be reopened from the list by selecting this option.

- (d) “Export List...”: Export one or more variables from the Current Subsets list to a file. The default output path is the current directory. The variables should have same type, same rank, same dimensions, and same order. The submenu, as shown in [Fig. 4-8](#), includes:
- (i) “Without Filldata”: Export subset data without fill data values. The option “Without Reference” does not export data for a record if any item in the list has the fill value. The option “With Reference” does not export data for a record if the reference data value is a fill value.
 - (ii) “With Filldata”: Export subset data including those equal to fill values.

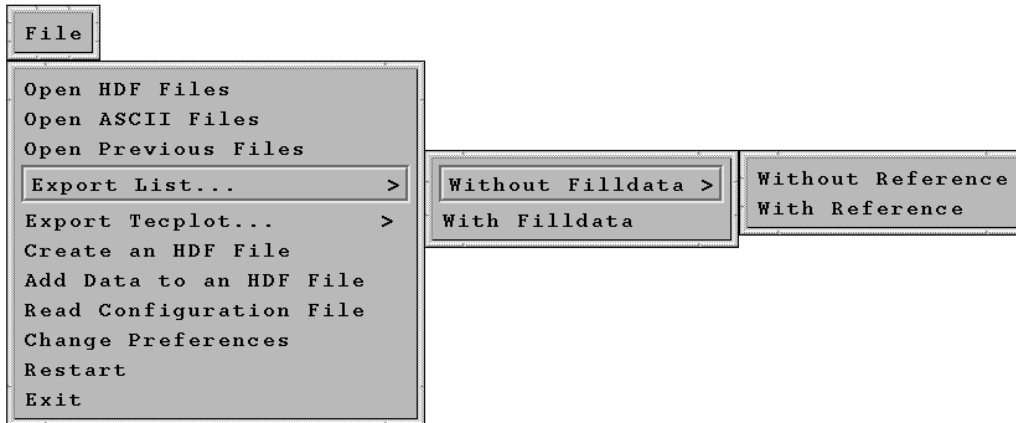


Fig. 4-8. Export List Submenu

- (e) “Export Tecplot...”: Export one or more variables from the Current Subsets list to a file in Tecplot data input format. The variables should have same type, same rank, same dimensions, and same order. The first column in the output file is the time of the day in seconds if the time variable is valid, otherwise the first column is the index of the variable. The submenu is the same as the “Export List...” option, [item 1\(d\)](#).

- (f) “Create an HDF File”: Write one or more subset data sets from the Current Subsets list to a new HDF file. The structure of the new file is same as that of the original file. For vdata sets, only one field is written. If the file already exists, that file will be overwritten. If two or more data sets have same name, four options will be given, as shown in [Fig. 4-9](#):

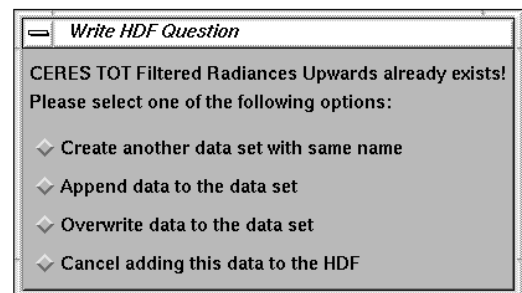


Fig. 4-9. Add HDF Option Menu

- (i) Create another data set with same name.
- (ii) Append data to the data set. The new data will be added at the end of the data set which is in the file.

- (iii) Overwrite data to the data set. The existing data set is overwritten. If this option is selected, a window, as shown in Fig. 4-10, pops up for entering the record number to start overwriting.
- (iv) Cancel adding this data to the HDF file.

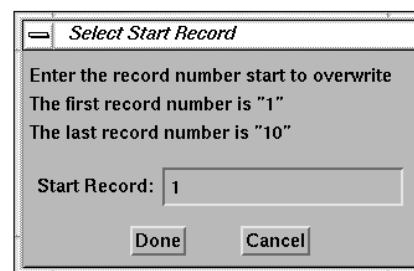


Fig. 4-10. Select Start Record Window

- (g) "Add Data to an HDF File": Add subset data to an existing HDF file. If the file does not exist, it will be created. If the data set to be written has the same name as a data set already in the file, four options will be given as shown in Fig. 4-9. **Note:** Users should be careful when using this editing HDF file feature. It is recommended that original HDF files not be modified.
- (h) "Read Configuration File": Reread the configuration file. The values in the configuration file will replace the current values.
- (i) "Change Preferences": Change the default settings of input and output directories, user-defined procedure directory, temporary directory, home directory, editor, open file filter, default color table, open format, and screen size. If this option is selected, a window, as shown in Fig. 4-11, pops up to display the current settings.

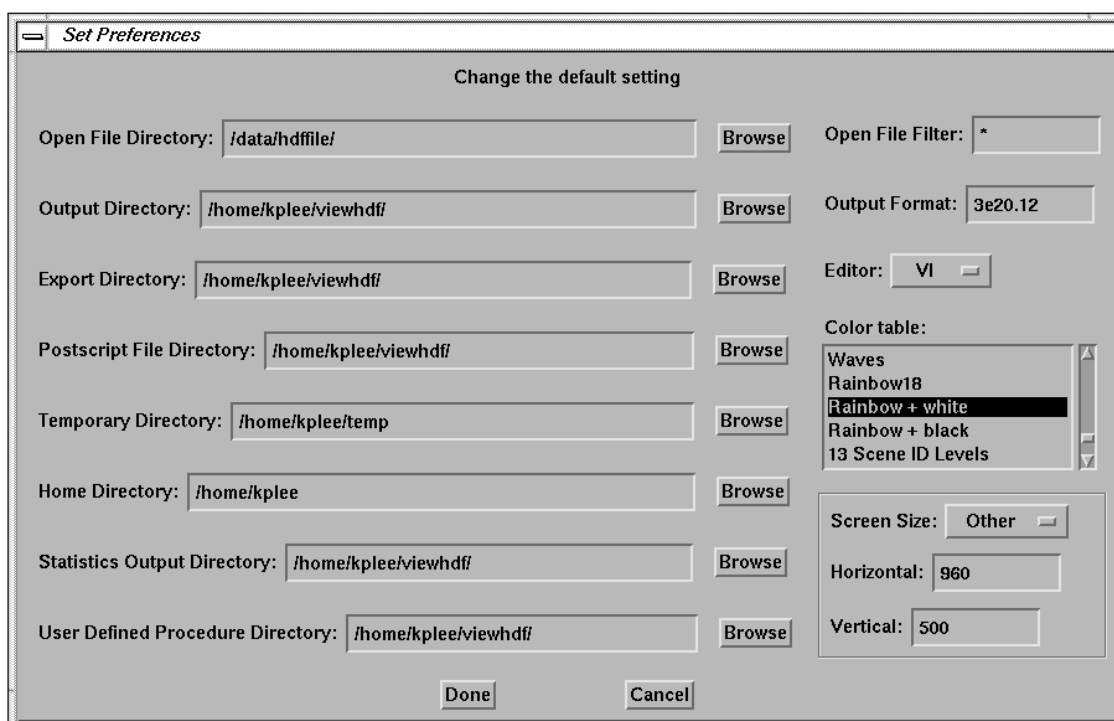


Fig. 4-11. Change Preferences Window

The “Browse” buttons allow the user to search the correct paths for corresponding directories. Other fields include:

- (i) “Open File Filter”: Set a filter to refine the list of file names displayed on open file window.
- (ii) “Output Format”: Change the format for exporting data to a file. The format syntax is the same as a FORTRAN-style specification. The default format is “e18.9”.
- (iii) “Editor”: Select a text editor to display data or a file on the screen. The options in this field are:
 - 1. “VI”: Use vi editor to display data or file. This is the default.
 - 2. “Emacs”: Use emacs editor to display data or file.
 - 3. “Ieditor”: Use ieditor editor to display data or file. Note: this editor may not be available on all machines. The view_hdf.pro program can be modified to specify the editor of choice.

- 4. “Other”:
Use this option to specify an editor other than the above three options.

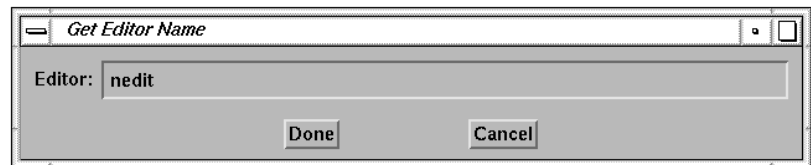


Fig. 4-12. Get Editor Name Window

A window, as shown in [Fig. 4-12](#), pops up for entering the command used to start the editor, including any command line options.

- (iv) “Color table”: Set the default color table. The default is “Rainbow”.
- (v) “Screen Size”: Set the size of the draw window. The size is in pixels. The options are:
 - 1. “1024x600”: The size of the draw window is set to 1024x600 pixels. This is the default for a Sun workstation.
 - 2. “1152x614”: The size of the draw window is set to 1152x614 pixels. This is the default for an SGI workstation.
 - 3. “Other”: This option can be used to specify the size of the draw window. If this option is selected, the “Horizontal” and “Vertical” fields become activated for entering the new values.

Click the “Done” button to use the changed values as the default setting. Click the “Cancel” button to cancel this selection. This window will automatically pop up when a user starts view_hdf if the user’s configuration file does not exist.

- (j) “Restart”: Restart view_hdf. All the data sets in Current Subsets list will be removed and all the currently active widgets will be destroyed.
- (k) “Exit”: Exit the view_hdf program and return to the IDL prompt.

- (2) “Graphic”: This menu is for plotting one or more variables from the Current Subsets list. The menu is shown in Fig. 4-13.

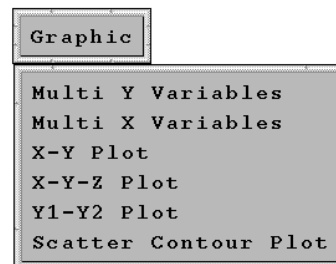


Fig. 4-13. Graphic Menu

The options are:

- (a) “Multi Y Variables”: Plot one or more Y variables against one X variable on the same graph. If this option is selected, a window, as shown in Fig. 4-14, pops up to select all or some variables from the list.

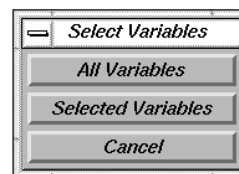


Fig. 4-14. Select Variables Window

If only some variables are selected, another window, shown in Fig. 4-15, will pop up to select the variables. Click the “Done” button when the selection is made or the “Cancel” button to cancel. For this example, the top two variables are selected.

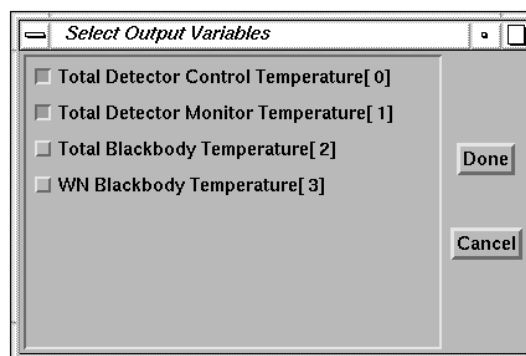


Fig. 4-15. Select Multiple Variables Window

After the “Done” button is clicked, the Select a Graph Style window, shown in Fig. 4-16, pops up. The “2D Graph” is plotted against the index of the arrays. The “XY Graph” is plotted against time, record number, sample number, packet number, or a variable selected from the Current Subsets list.

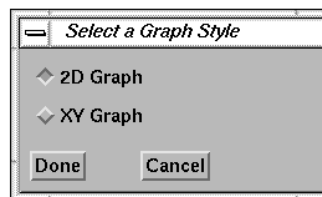


Fig. 4-16. Select Graph Type Window

After clicking the “Done” button, the plot will display on the screen as shown in Fig. 4-17.

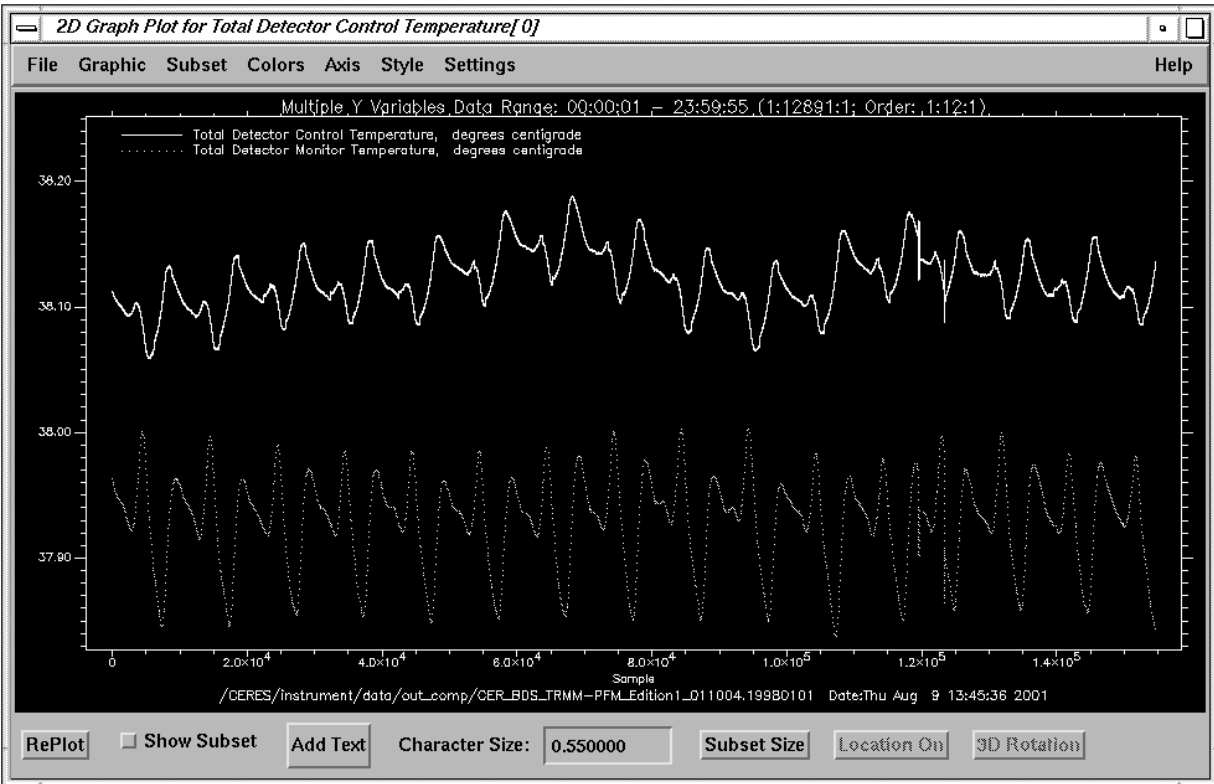


Fig. 4-17. Multiple Variables Plot

(b) “Multi X Variables”: Plot one Y variable against one or more X variables from Current Subsets list on the same graph. The procedure is similar to [item 2\(a\)](#).

(c) “X-Y Plot”: Plot one variable against another variable. If this option is selected, a Select Plot Fields window, as shown in [Fig. 4-18](#), pops up for selection. Click the “Done” button when the selection is completed.

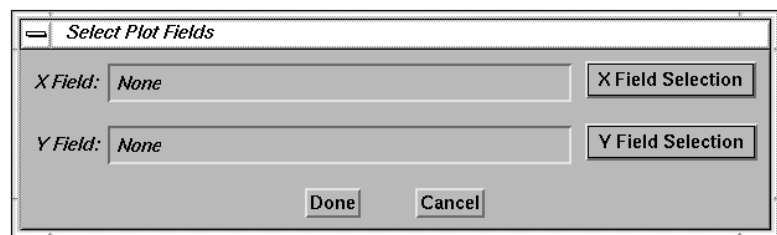


Fig. 4-18. Select X and Y Fields Window

- (d) “X-Y-Z Plot”: Plot one variable (Z) against two variables (X,Y). The Z values are represented by color. If this option is selected, a Select Plot Fields window, as shown in Fig. 4-19, pops up. After selecting the variables, click the

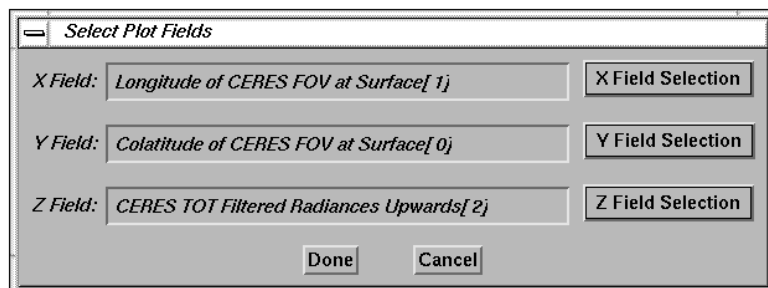


Fig. 4-19. Select X, Y, and Z Fields Window

“Done” button, and the X-Y-Z plot will display on the screen as shown in Fig. 4-20.

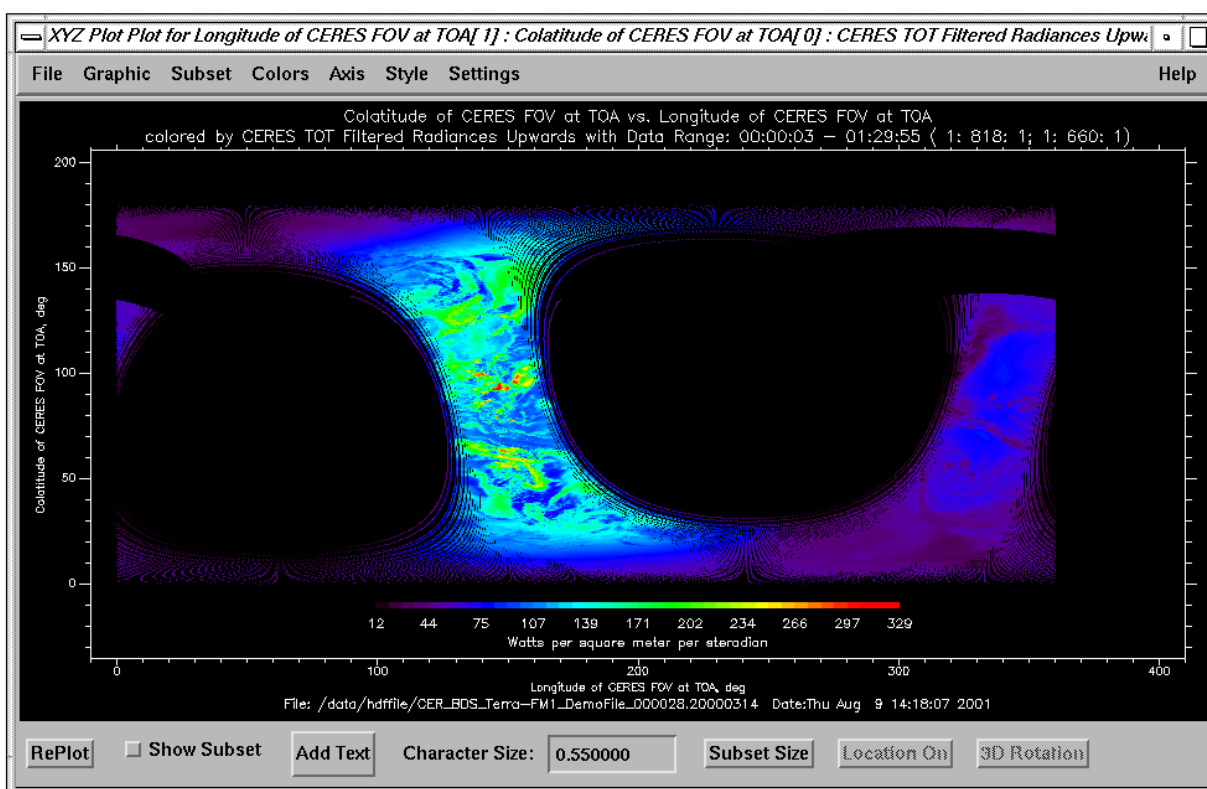


Fig. 4-20. X-Y-Z Plot

- (e) “Y1-Y2 Plot”: Plot two variables against the index of the arrays or time on the same graph with two different Y axes. The procedure is the same as the “Multi Y Variables” option; see item 2(a). An example plot with the same variables shown in Fig. 4-17 is shown in Fig. 4-21.

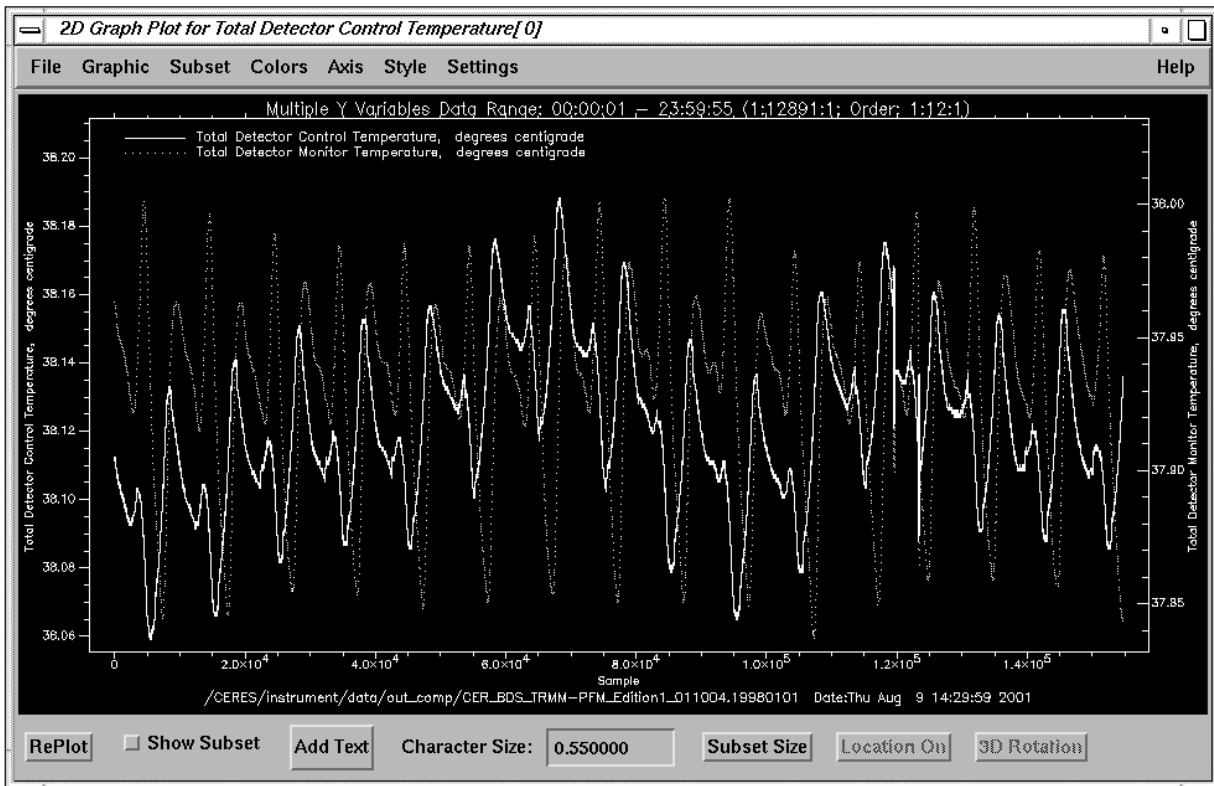


Fig. 4-21. Y1-Y2 Plot

- (f) “Scatter Contour Plot”: Convert scattered data into gridded data format and create a contour plot. The default number of grids is 360 X 180 points. User can use the “Map” option under the “Settings” menu to change the default number; see [item 8\(b\)](#). For example, the scattered data shown in [Fig. 4-22](#) is converted into the contour plot shown in [Fig. 4-23](#).

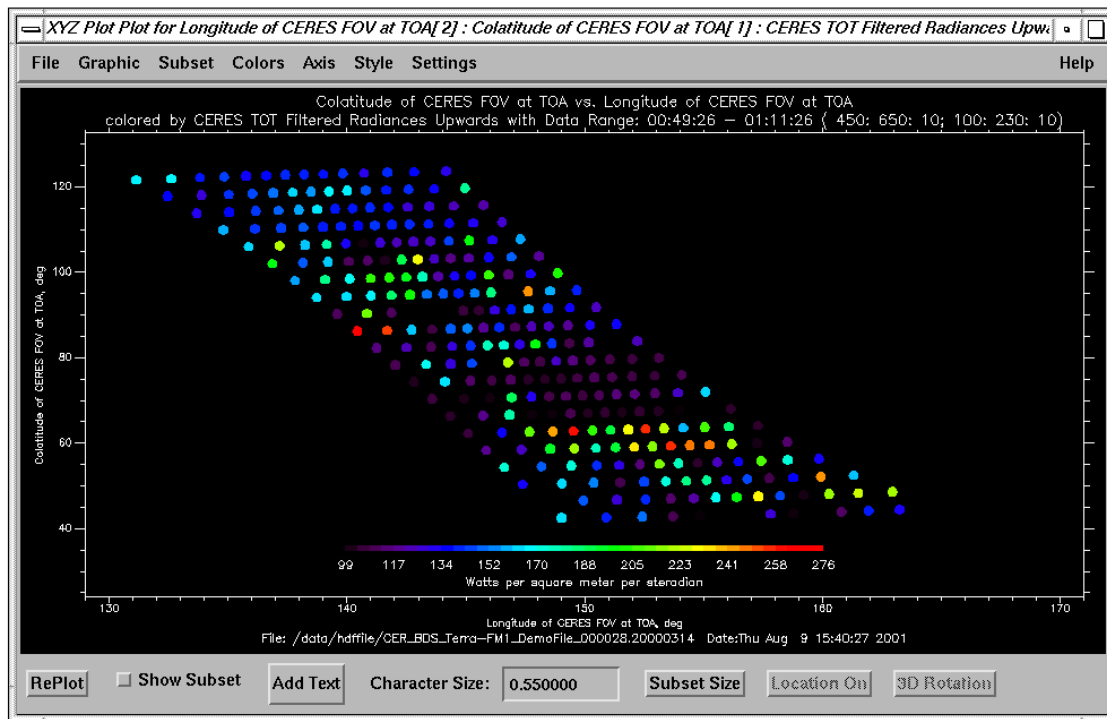


Fig. 4-22. Scattered Data Set

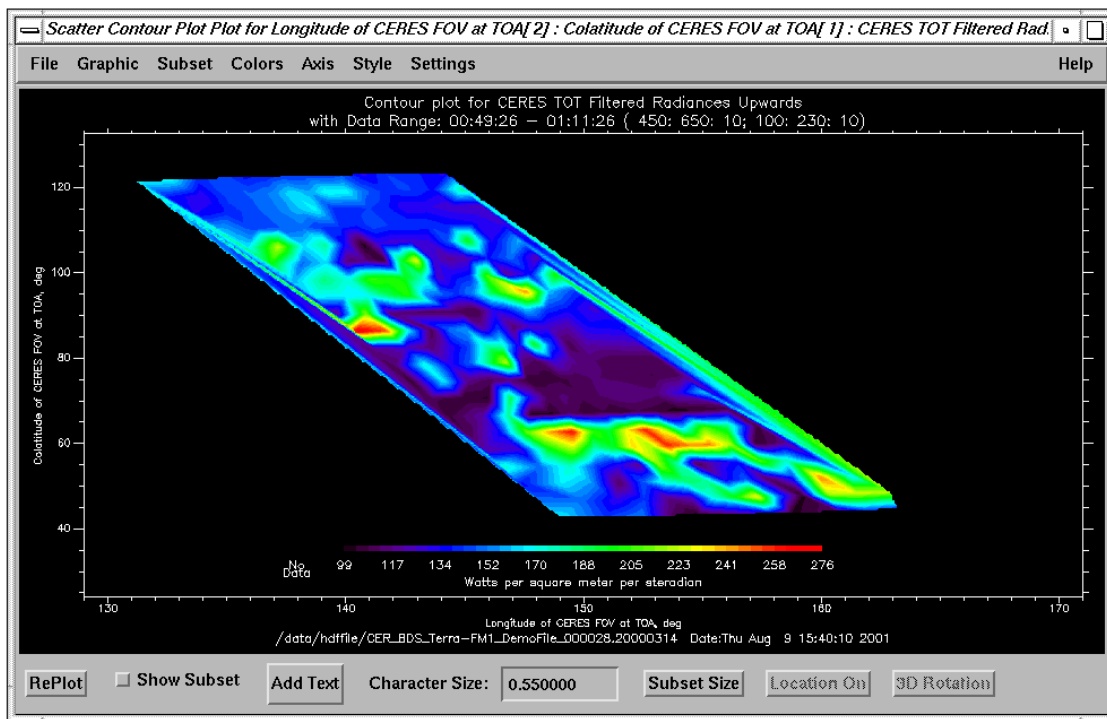


Fig. 4-23. Scatter Contour Plot

- (3) “Compute”: This menu includes options for doing simple arithmetic operations between two variables or between one variable and a constant, and for extracting specific contiguous bits from an integer variable. The variables need to be imported into the Current Subsets list before selecting this option. The result is added to the Current Subset list. The options in this menu are shown in Fig. 4-24.

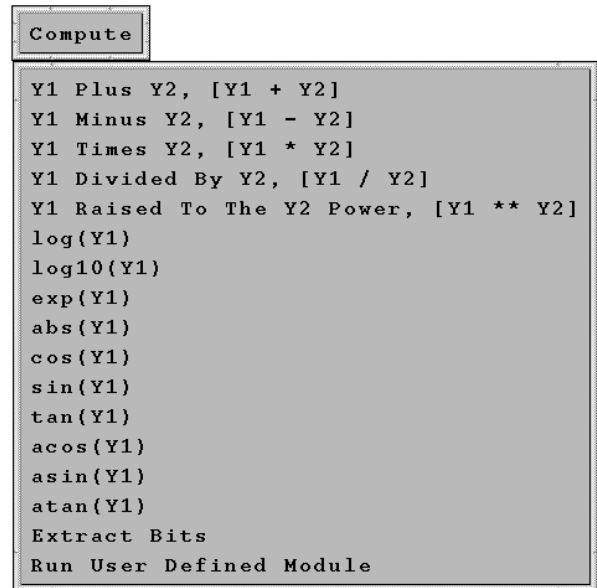


Fig. 4-24. Compute Menu

The options are:

- (a) “Y1 Plus Y2, [Y1 + Y2]”: Calculate the sum of two variables or one variable and a constant value. If this option is selected, a window, as shown in Fig. 4-25, pops up to select the operands from the list.

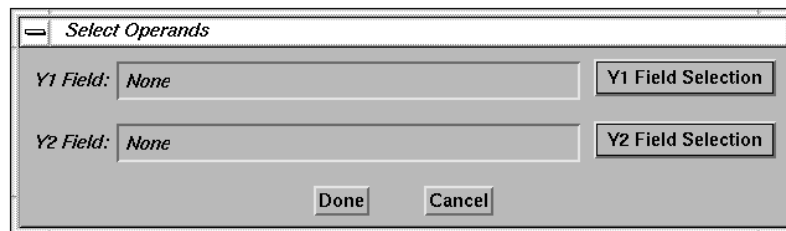


Fig. 4-25. Select Operands Window

If one of the operands is constant, another window will pop up for entering the constant value, as shown in Fig. 4-26. Click the “Done” button after entering the constant value, or click the “Cancel” button to close the window. An error message will be given if both operands are selected as constant. After selecting the operands, click the “Done” button on the Select Operand Window. A window will pop up for entering the name of the variable for the result of this operation, as shown in Fig. 4-27.

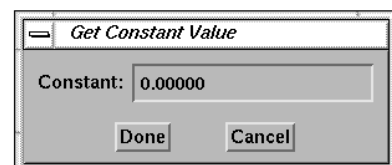


Fig. 4-26. Get Constant Value Window

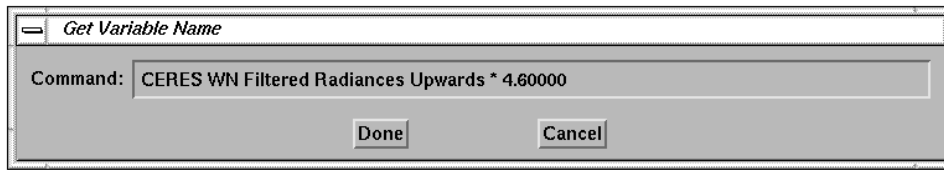


Fig. 4-27. Get Variable Name Window

After entering the name of the variable, click the “Done” button. A window, as shown in Fig. 4-28, pops up.

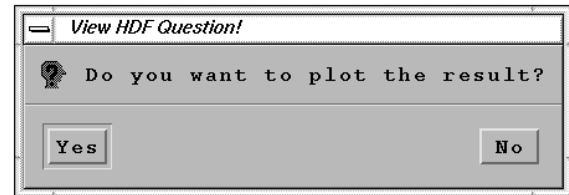


Fig. 4-28. Question for Displaying Plot

Click the “Yes” button to display the result and another window, as shown in Fig. 4-29, will pop up for selecting the type of plot. The “Sample” is plotted against the index of the array, and the “Time” is plotted against the time. Click the “No” button if you decide not to display the result.

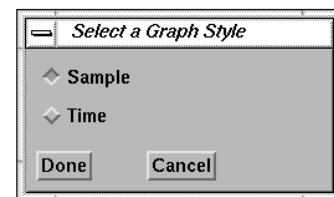


Fig. 4-29. Select Graph Style

- (b) “Y1 Minus Y2, [Y1 - Y2]”: Calculate the difference of two variables or one variable and a constant value. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (c) “Y1 Times Y2, [Y1 * Y2]”: Calculate the product of two variables or one variable and a constant value. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (d) “Y1 Divided By Y2, [Y1 / Y2]”: Calculate the quotient of two variables or one variable and a constant value. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (e) “Y1 Raised To The Y2 Power, [Y1 ** Y2]”: This option allows calculation of the square root of Y1 when Y2 is set to 0.5, the square of Y1 when Y2 is set to 2, and the inverse of Y1 when Y2 is set to -1. Y2 can be set to any value. If Y2 is not set to an integer number, all the negative values of Y1 are set to the fill value and the result is not calculated. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (f) “log(Y1)”: Compute the natural logarithm of the Y1 variable. This procedure is the same as “Y1 Plus Y2”; see [item 3\(a\)](#).
- (g) “log10(Y1)”: Compute the logarithm of the base 10 of the Y1 variable. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).

- (h) “exp(Y1)”: Compute the natural exponential function of the Y1 variable. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (i) “abs(Y1)”: Compute the absolute value of the Y1 variable. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (j) “cos(Y1)”: Compute the cosine of the Y1 variable. Set Y2 equal to 0 for Y1 values expressed in units of degrees and set Y2 equal to 1 for Y1 values expressed in radians by selecting the “Constant” option for Y2 variable. The default for Y2 is 0. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (k) “sin(Y1)”: Compute the sine of the Y1 variable. See explanation of Y2 in [item 3\(j\)](#). This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (l) “tan(Y1)”: Compute the tangent of the Y1 variable. See explanation of Y2 in [item 3\(j\)](#). This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (m) “acos(Y1)”: Compute the arc cosine of the Y1 variable. The results are in degrees when Y2 is set to 0 and in radians when Y2 is set to 1. This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (n) “asin(Y1)”: Compute the arc sine of the Y1 variable. See explanation of Y2 in [item 3\(m\)](#). This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (o) “atan(Y1)”: Compute the arc tangent of the Y1 variable. See explanation of Y2 in [item 3\(m\)](#). This procedure is the same as “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#).
- (p) “Extract Bits”: Extract specific contiguous bits from an integer variable. This is useful for isolating flag bit fields that are packed together in a single variable. If this option is selected, a window, as shown in [Fig. 4-30](#), pops up for selecting the variable and for entering the location bit and how many bits to extract. Click the “Done” button after entering the values. Follow similar procedures for “Y1 Plus Y2, [Y1 + Y2]”; see [item 3\(a\)](#), to enter the variable name and plot the result.

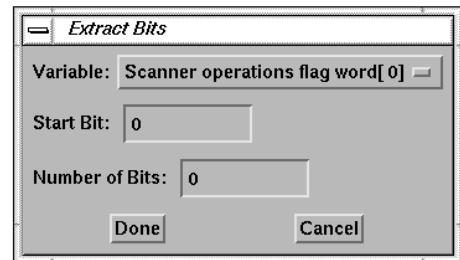


Fig. 4-30. Extract Bits Window

- (q) “Run User Defined Module”: This option allows a user to execute any IDL procedure which is not included in the view_hdf tool and is written by the user. The requirements for the procedure are:
 - (i) The first command line in the procedure must start with “pro” and the file name must be the same as the procedure name with the extension “.pro”.
 - (ii) The maximum number of arguments is 22. They can be variables in the Current Subsets list, constant values, constant value arrays, and strings. For constant arrays, the elements are separated by commas.
 - (iii) If the procedure has output data which are put into the Current Subsets list, they must be the last procedure arguments listed, and they must be arrays.

The data sets used in the procedure must be imported to the Current Subsets list before selecting this option. A window will pop up for selecting the user defined module, as shown in Fig. 4-31.

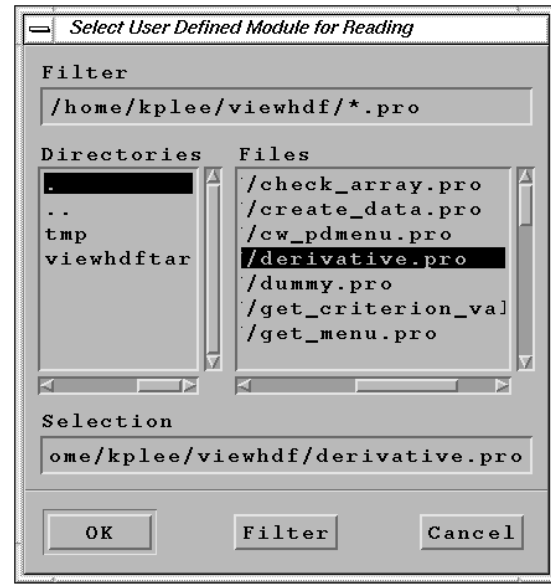


Fig. 4-31. Select User Defined Module Window

After a procedure is selected, another window, as shown in Fig. 4-32, will pop up for asking for the number of output arguments if the procedure has one or more arguments. Click the "Done" button after entering the number of output parameters. Click the "Cancel" button to cancel this selection. If there is an output

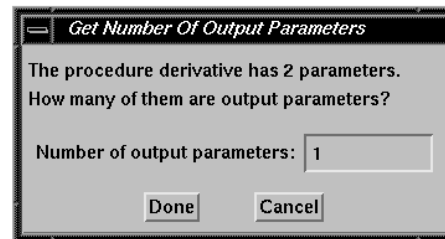


Fig. 4-32. Number of Output parameters Window

variable, a window, as shown in Fig. 4-33, pops up for entering the name of the output variable that will be put into the Current Subsets list. Click the "Done" button after entering the name or the "Cancel" button to cancel this selection.

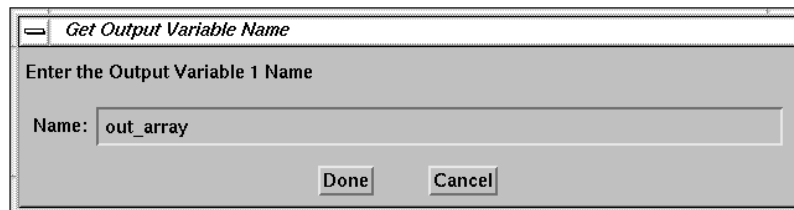


Fig. 4-33. Get Output Variable Name Window

After entering the name, another window, as shown in [Fig. 4-34](#), pops up for entering the unit value for this variable. Click the “Done” button after entering the unit value or the “Cancel” button to cancel this selection.

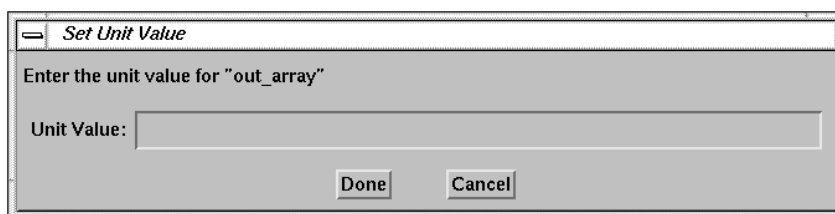


Fig. 4-34. Set Unit Value Window

If the procedure has one or more input arguments, the window, as shown in [Fig. 4-35](#), pops up for selecting either a constant value or a variable from the Current Subsets list.

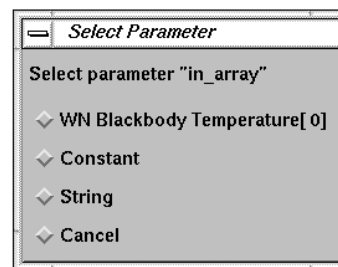


Fig. 4-35. Select Input Parameter Window

If the “Constant” or “String” option is selected, a window, as shown in [Fig. 4-36](#), will pop up for entering the constant value, string, or constant array. If the input is a constant array, the elements are separated by commas. Click the “Done” button after entering the value or click the “Cancel” button to cancel this selection.

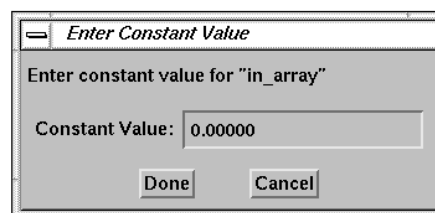


Fig. 4-36. Enter Constant Value Window

If the procedure has output variables, windows, as shown in [Fig. 4-37](#), will pop up for selecting reference data sets for storing the output data sets to the Current Subsets list after the procedure has executed. The reference data set defines the structure of the output data. If both data sets have the same number of elements, the data set will be saved with the same rank and dimension for SDS data or with the same order and record number for Vdata as the reference data set. If they do not have same number of elements, the data set will be saved with its own rank and dimension for SDS data or with order equal to one for Vdata. If “No Reference” is selected, the data set will be stored in SDS structure.

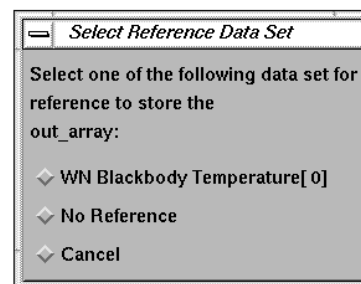


Fig. 4-37. Select Reference Data Window

- (4) “Curve Fit”: Do curve fitting from one variable to another variable. The calculated values and errors for the curve fit are added into the Current Subset list. The four models for curve fitting in this option are shown in Fig. 4-38.

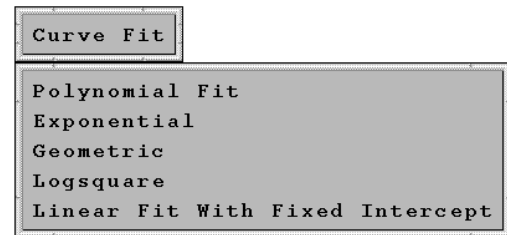


Fig. 4-38. Curve Fit Menu

The options are:

- (a) “Polynomial Fit”: Use least-square polynomial fit. The form is:

$$y = a_0 + a_1 x + \dots$$

If this model is selected, a window, as shown in Fig. 4-39, pops up for selecting the independent variable, dependent variable, and the degree of the polynomial to fit. The default degree is one. Click the

“Done” button after selecting all the fields, and another window will pop up for entering the name of the variable which will store the calculated Y values, as shown in Fig. 4-27. Click the “Done” button after entering the name of the new variable. The calculated values and the error estimates will be added into the Current Subset list. A window, as shown in Fig. 4-40, pops asking the output options. They are:

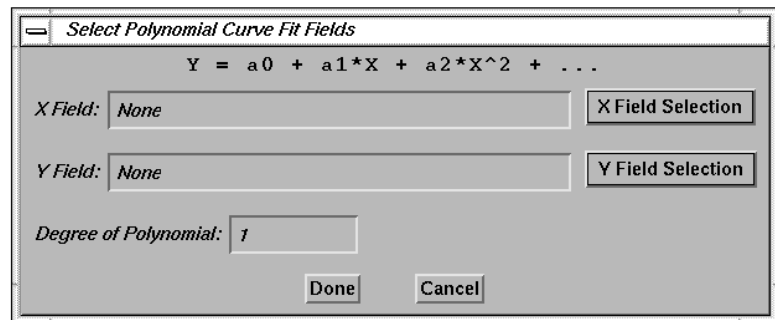


Fig. 4-39. Select Polynomial Fit Parameter Window

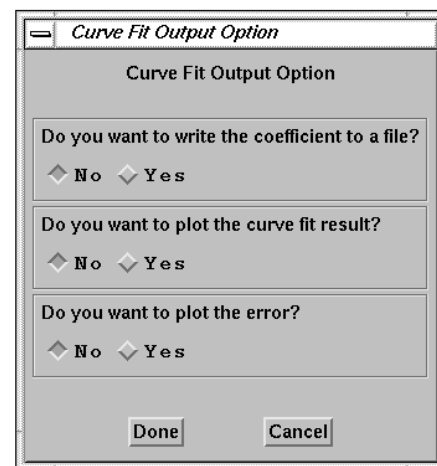


Fig. 4-40. Curve Fit Output Options Window

- (i) Write the coefficient to a file. The default is “No”.
- (ii) Plot the curve fit result. The default is “No”.
- (iii) Plot the error. The default is “No”.

An example output for writing coefficients to a file is shown in Fig. 4-41, and an example plot with the result of the polynomial fit and error estimates are shown in Fig. 4-42

```

vi
Source Data Filename: /CERES/instrument/data/out_comp/CER_BDS_TRMM-PFM_Edition1_
011004.19980101
Data Name: Total Blackbody Temperature[ 0]
Unit: degrees centigrade
Data Range: 00:00:01 - 23:59:55 (1:12891:1; Order: 1:12:1)
The curve fit equation with polynomial is:

Y = -16.239876 + 0.018182866 X

Y = Total Blackbody Temperature, degrees centigrade
X = Total Blackbody Temperature, counts

Linear Pearson correlation coefficient = 0.99999208

```

Fig. 4-41. Output file for Polynomial Fit Result

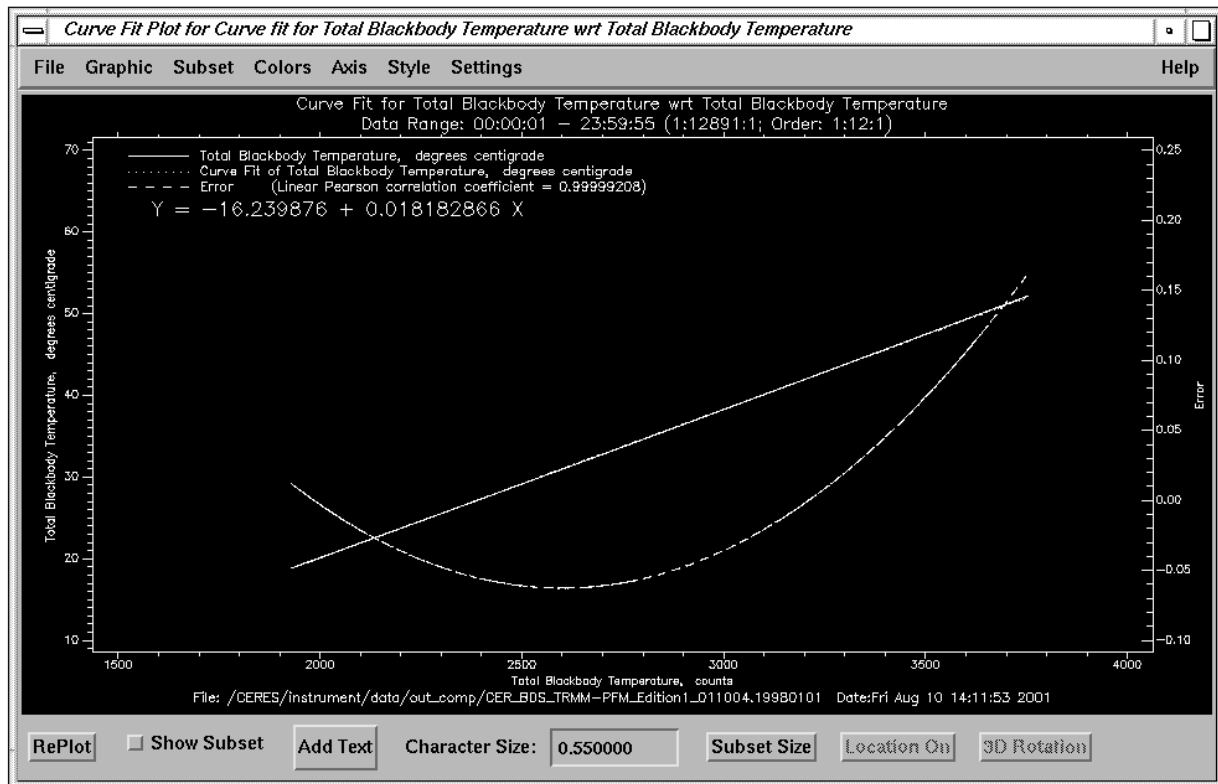


Fig. 4-42. Polynomial Fit Result with Error Estimates

- (b) “Exponential”: Use a gradient-expansion least-squares method with an exponential model. The form of this model is expressed as:

$$y = a_0 a_1^x + a_2$$

If this model is selected, a window, as shown in Fig. 4-43, pops up for selecting the independent and dependent variables. The procedure is the same as “Polynomial Fit”; see item 4(a).

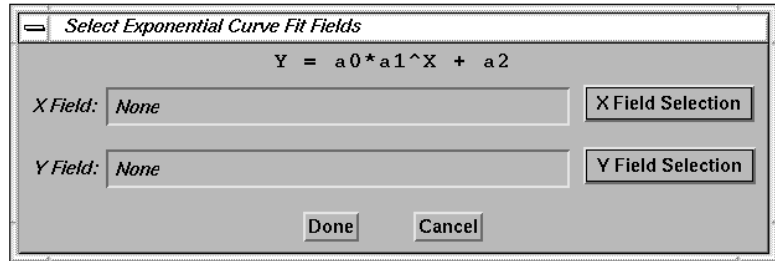


Fig. 4-43. Select Exponential Model Fit Parameter Window

- (c) “Geometric”: Use a gradient-expansion least-squares method with a geometric model. The form of this model is expressed as:

$$y = a_0 x^{a_1} + a_2$$

The procedure is the same as “Polynomial Fit”; see item 4(a).

- (d) “Logsquare”: Use a gradient-expansion least-squares method with a logsquare model. The form of this model is expressed as:

$$y = a_0 + a_1 \log(x) + a_2 \log(x)^2$$

The procedure is the same as “Polynomial Fit”; see item 4(a).

- (e) “Linear Fit With Fixed Intercept”: Use a first order of polynomial fit with the intercept specified by the user. The procedure is the same as “Polynomial Fit”; see item 4(a).

- (5) “Colors”: This menu includes options for selecting different color tables, editing and saving the color map, and changing the background and foreground colors. The menu is shown in Fig. 4-44.

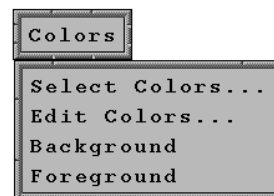


Fig. 4-44. Colors Menu

The options are:

- (a) “Select Colors...”: Select the predefined color tables. If this option is selected, the current color table is displayed and a list of available predefined color tables is given, as shown in Fig. 4-45. Click on the name of a color table to load the color table. For example, the table “Rainbow + white” is useful for many CERES data products. Click the “Done” button when selection is completed.



Fig. 4-45. Select Color Table

- (b) “Edit Colors...”: Edit the current color table. If this option is selected, all the colors in the current color map will be displayed, as shown in Fig. 4-46. Click on the color index or move the slider to select the color index to edit.

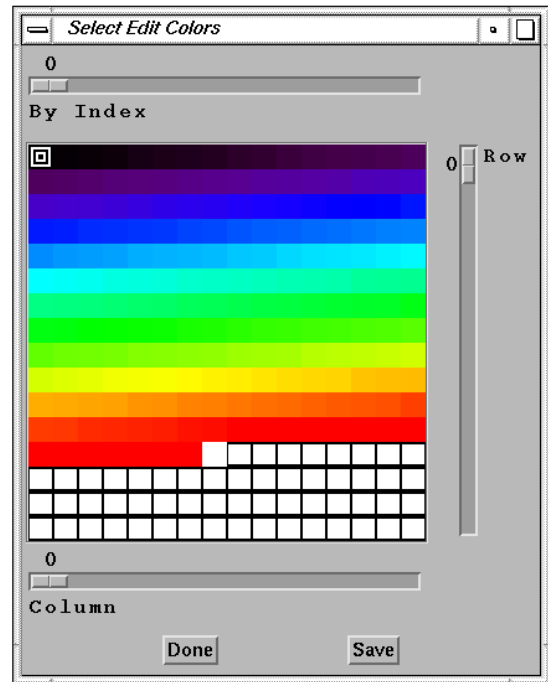


Fig. 4-46. Edit Color Map

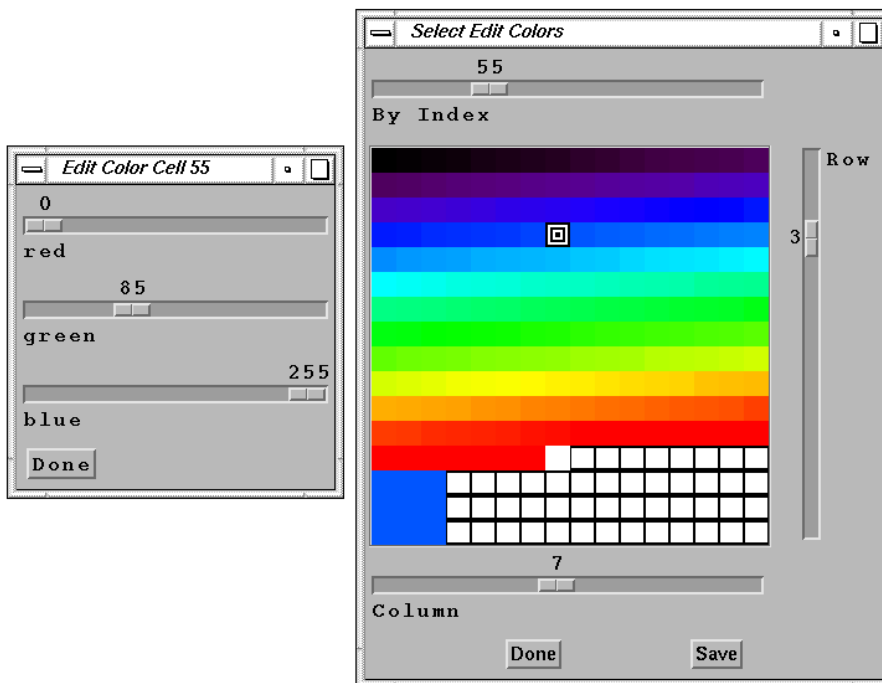


Fig. 4-47. Edit Color Cell Window

An RGB sliders window, as shown in Fig. 4-47, will pop up for adjusting the RGB value. A small sample color square will show on the lower left corner of the Select Edit Colors window. Click the “Done” button on the Edit Color Cell window after adjusting the color. Click the “Done” button on the Select Edit Colors window to use the edited colors for the current session without saving the changes to the color table file. Click the “Save” button to save the modified color table to the color table file for later use.

If the “Save” button is selected, a window, as shown in Fig. 4-48, pops up for entering the name of the new color table. After entering a new table name, click the “Done” button. Click the “Cancel” button to exit without saving the new color table.



Fig. 4-48. New Color Table Name Window

- (c) “Background”: Change the background color. A window, as shown in Fig. 4-49, pops up for changing the background color if this option is selected. Value zero means the background color is the color of the index zero in the current color table. Click the “Done” button to use a new value, or the “Cancel” button to cancel this selection.



Fig. 4-49. Enter Background Color window

- (d) “Foreground”: Change the foreground color. A window, as shown in Fig. 4-50, pops up for changing the foreground color if this option is selected. The foreground color is the default color to display text or graphics on the screen. The foreground color should not be the same as the background color. Click the “Done” button to use the new value, or the “Cancel” button to cancel this selection.



Fig. 4-50. Enter Foreground Color window

- (6) “Axis”: This menu includes the options for manually or automatically setting the X, Y, and/or Z axes ranges. It also includes options for producing grid lines and using linear or logarithmic axes. The menu is shown in Fig. 4-51.

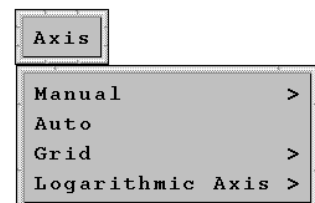


Fig. 4-51. Axis Menu

The options are:

- (a) “Manual”: Enter the ranges of the X, Y, and/or Z axes, or the ranges of the X, Y1, and/or Y2 axes for “Y1-Y2 Plot” manually. The submenu is shown in Fig. 4-52. Click on any option, and a window will pop up for entering the ranges. Figure 4-53, Fig. 4-54, and Fig. 4-55 show the options for “X Only”, “XY Only”, and “XYZ”, respectively. Click the “Done” button to apply the ranges, or click the “Cancel” button to close the window.

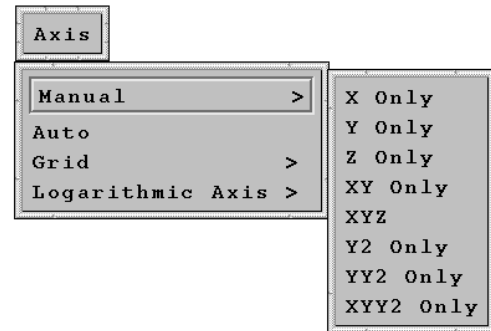


Fig. 4-52. Axis-Manual

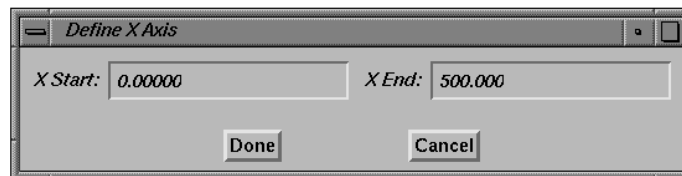


Fig. 4-53. Set X Axis Range Window

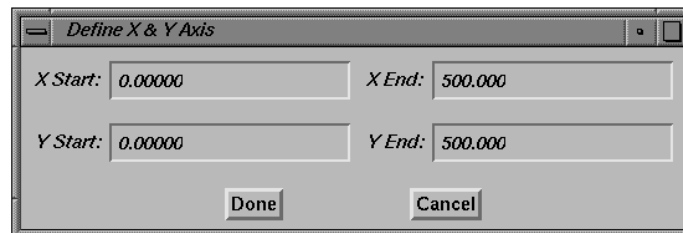


Fig. 4-54. Set X and Y Axes Ranges Window

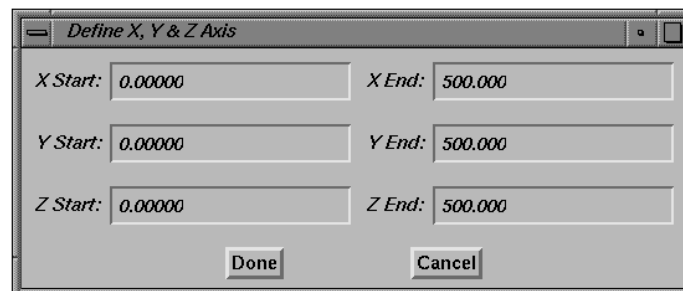


Fig. 4-55. Set X, Y, and Z Axes Ranges Window

- (b) “Auto”: Set the ranges of the axes automatically to span the minimum to the maximum data values. This is the default.

- (c) “Grid”: Draw grid lines on the major tick marks. The submenu is shown in Fig. 4-56. An example of a 2D plot with the option “With XY Grid” is shown in Fig. 4-57. The default is “Without Grid”.

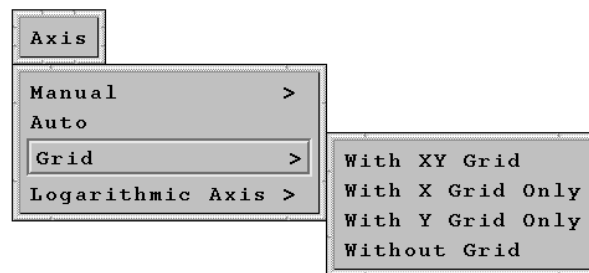


Fig. 4-56. Axis-Grid Submenu

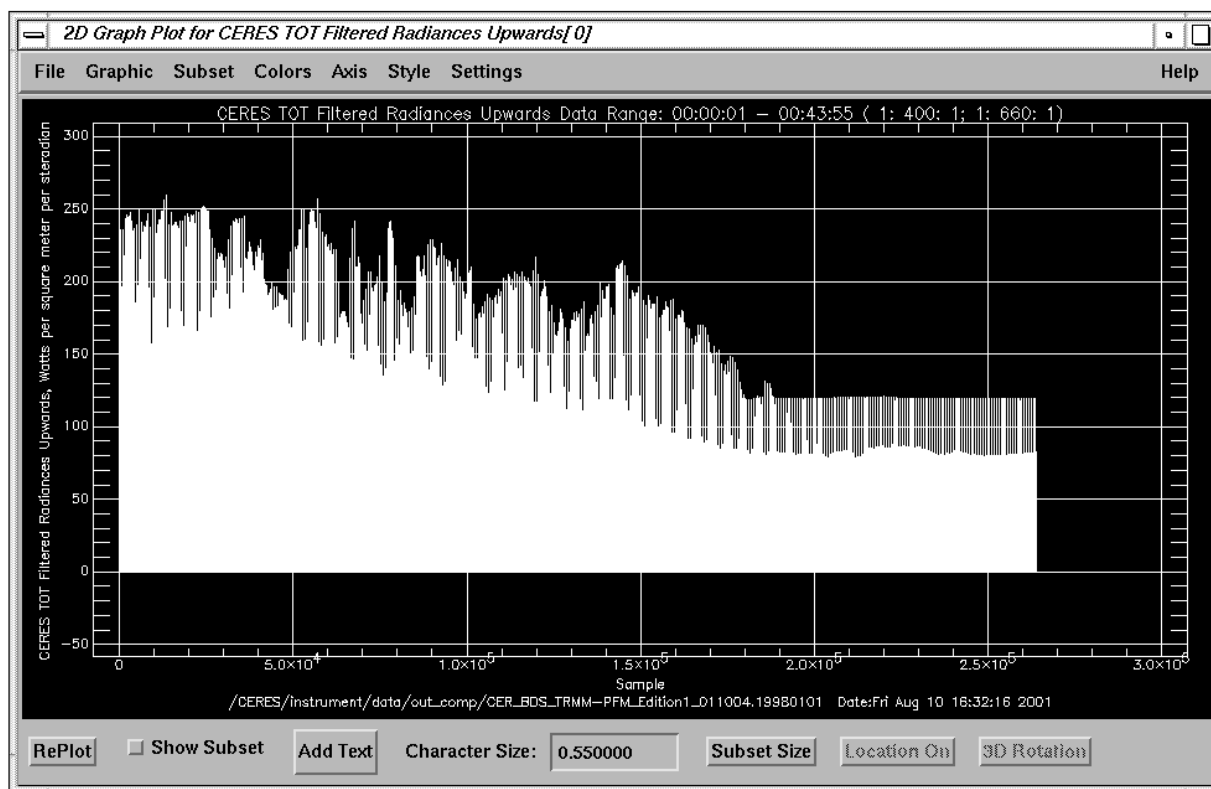


Fig. 4-57. 2D plot with XY grid

- (d) “Logarithmic Axis”: Set the X, Y, and/or Y1 axes as logarithmic axes instead of linear axes. The submenu is shown in Fig. 4-57. The default is the “With Linear Axes” option.

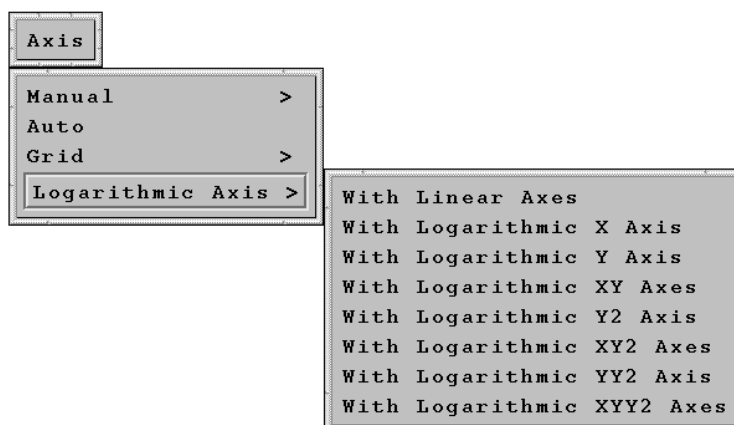


Fig. 4-58. Axis-Logarithmic Axis Submenu

- (7) “Style”: This menu includes options for setting the line type, symbol type, and symbol size used to display the data. The menu is shown in Fig. 4-59.

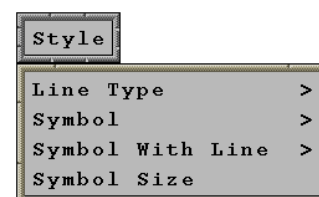


Fig. 4-59. Style Menu

The options are:

- (a) “Line Type”: Select the line type used to join data points. The available line types, as shown in Fig. 4-60, are:

- (i) “Solid”: Use a solid line to join data points. This is the default.
- (ii) “Dotted”: Use a dotted line to join data points.
- (iii) “Dashed”: Use a dashed line to join data points.
- (iv) “Dashed Dot”: Use a dashed dot line to join data points.
- (v) “Dashed Dot Dot Dot”: Use a dashed dot dot dot line to join data points.
- (vi) “Long dashes”: Use a long dashed line to join data points.



Fig. 4-60. Style-Line Type Submenu

(b) “Symbol”: Select line or symbols to display the data. The submenu, as shown in Fig. 4-61, includes:

- (i) “No Symbol”: Use a line to display data. This is the default.
- (ii) “Plus sign”: Use a plus sign, “+”, to mark data points.
- (iii) “Asterisk”: Use an asterisk, “*”, to mark data points.
- (iv) “Period”: Use a period, “.”, to mark data points.
- (v) “Diamond”: Use a diamond to mark data points.
- (vi) “Triangle”: Use a triangle to mark data points.
- (vii) “Square”: Use a square to mark data points.
- (viii) “X”: Use the letter “X” to mark data points.
- (ix) “Circle”: Use a circle to mark data points.
- (x) “FOV”: Use the CERES FOV symbol to mark data points.
- (xi) “Filled Triangle”: Use a filled triangle to mark data points.
- (xii) “Filled Square”: Use a filled square to mark data points.
- (xiii) “Filled Circle”: Use a filled circle to mark data points.
- (xiv) “Filled FOV”: Use a filled CERES FOV symbol to mark data points.

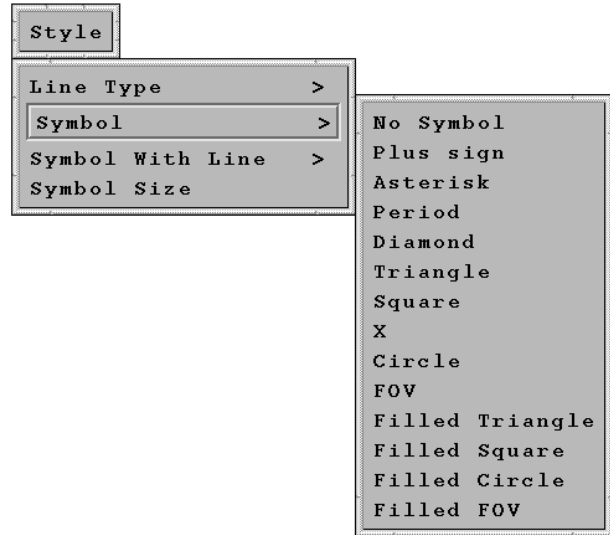


Fig. 4-61. Style-Symbol Submenu

(c) “Symbol With Line”: Select to use or not to use a line to connect all the symbols if a symbol is selected to mark the data points. The submenu, as shown in Fig. 4-62, includes:

- (i) “Without Line”: Do not connect symbols with a line. This is the default.
- (ii) “With Line”: Connect the data point symbols with a line.

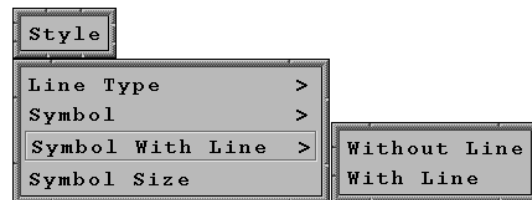


Fig. 4-62. Style-Symbol With Line Submenu

(d) “Symbol Size”: Set the size of the symbol to mark the data points. If this option is selected, a window, as shown in Fig. 4-63, pops up for entering the new size of the symbol. The default size is 1.0 which is approximately the same size as a character. Click the “Done” button after entering the size, or click the “Cancel” button to close the window.

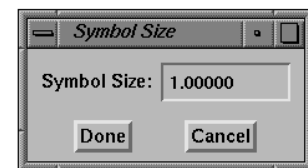


Fig. 4-63. Symbol Size Window

- (8) “Settings”: This menu allows a user to modify various display settings. The menu is shown in Fig. 4-64. After selecting an option in this menu, a window will pop up with all the fields in this option. Users can change the values in the fields and click the “Done” button to accept the new settings or click the “Cancel” button to cancel the selection.

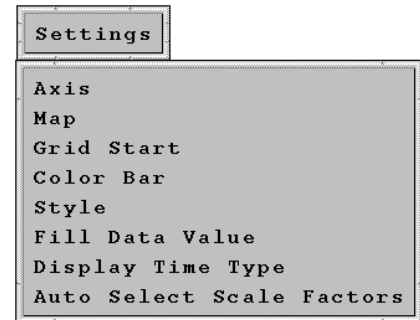


Fig. 4-64. Settings Menu

The options are:

- (a) “Axis”: This option includes setting the X, Y, and/or Z axes ranges manually or automatically, producing grid lines, and using linear or logarithmic axes. A window, as shown in Fig. 4-65, pops up for changing the settings if this option is selected. The fields in this window include:

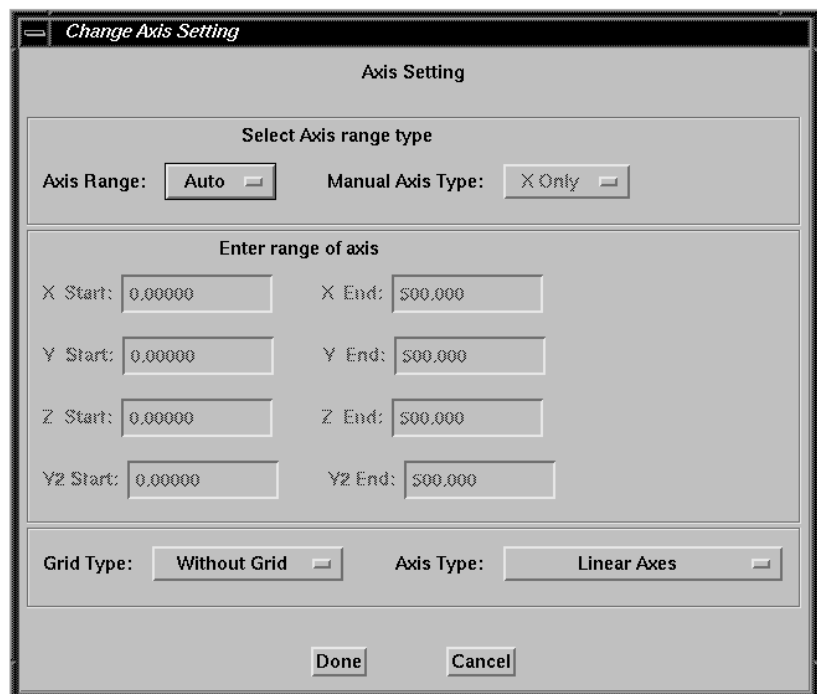


Fig. 4-65. Axis Settings Window

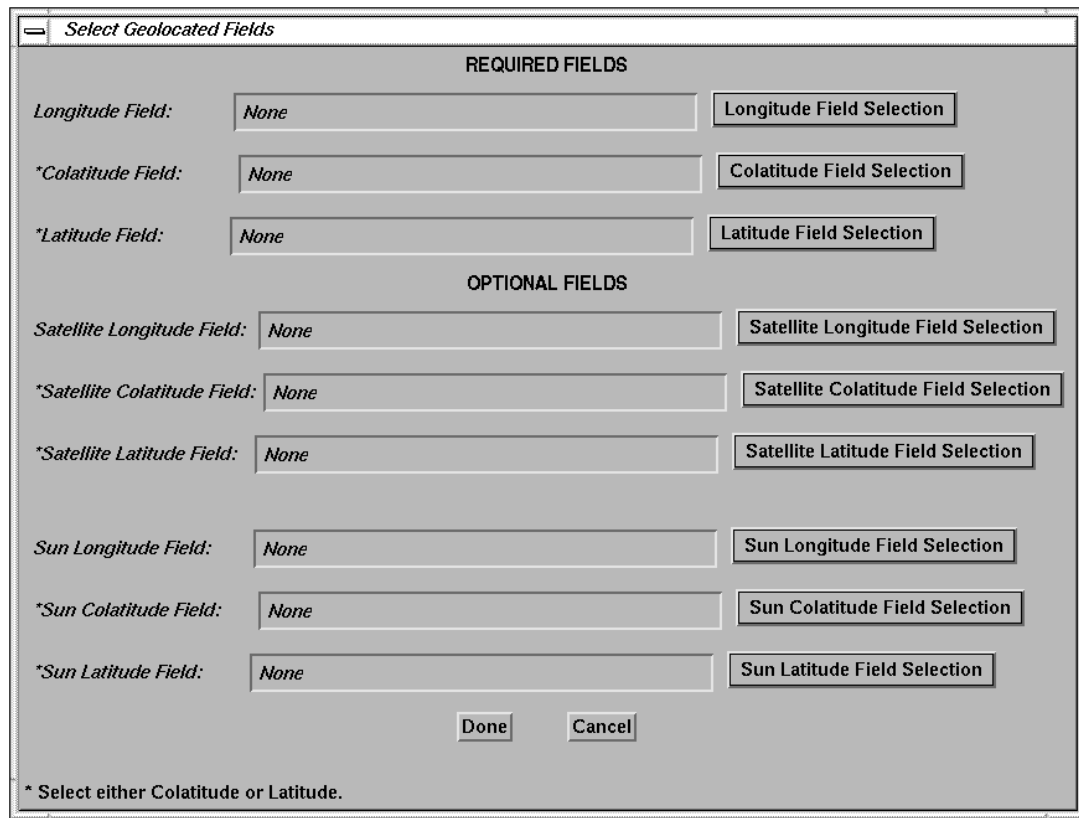
- (i) “Select Axis range type”: The axes range can be set to either “Auto” or “Manual” option. The default is “Auto”. If “Manual” is selected, the “Manual Axis type” option field becomes activated. There are nine options in this field for selecting the ranges of the X, Y, and/or Z axes, or the ranges of the X, Y1, and/or Y2 axes for a “Y1-Y2 Plot”.
- (ii) “Enter range of axis”: The corresponding fields becomes activated when the option in “Manual Axis type” is selected. Users can enter the values of the range.
- (iii) “Grid Type”: Draw or do not draw grid lines on the major tick marks. The default is “Without Grid”.
- (iv) “Axis Type”: Select linear or logarithmic axes to represent data on the plot. The default is “Linear Axes”.

- (b) “Map”: This option allows the user to adjust the display for any geolocated plot, such as the Earth location to be mapped to the center of the map projection, the type of map projection, labelling of the meridians, and showing the locations of the satellite and the Sun. The window for this option is shown in [Fig. 4-66](#). The fields include:

- (i) “Map Center Location”: Set the latitude and longitude location to be mapped to the center of the map projection. The default is zero degree for latitude and longitude.

- (ii) “Map Projection”: Set the type of map projection to be used. The projection types include “Cylindrical”, “Orthographic”, “Stereographic”, and “Hammer-Aitoff”. The default is “Cylindrical”.
- (iii) “Lat-Longitude”: Use default geolocation parameters or selected geolocation parameters from the Current Subsets list. The “Default” option uses default geolocation parameters which are imported from the current file automatically if they can be recognized; see [Section 5.0](#). If the geolocation parameters cannot be recognized, the default will switch to the “Select” option. The “Select” option selects geolocation parameters from Current Subsets list. The geolocation parameters need to be imported into the Current Subsets list before selecting this option. A window, as shown in [Fig. 4-67](#), pops up for selecting the parameters. The default is “Default”.

Fig. 4-66. Map Settings Window



Select Geolocated Fields

REQUIRED FIELDS

Longitude Field:

*Colatitude Field:

*Latitude Field:

OPTIONAL FIELDS

Satellite Longitude Field:

*Satellite Colatitude Field:

*Satellite Latitude Field:

Sun Longitude Field:

*Sun Colatitude Field:

*Sun Latitude Field:

* Select either Colatitude or Latitude.

Fig. 4-67. Select Geolocated Parameters Window

- (iv) “Label”: Label or do not label the latitudes and longitudes on the map projection. The default is “With Label”.
- (v) “Expand Lat-Long”: Expand or do not expand the longitude and latitude data from one dimension arrays to two dimensional arrays. When the data are two dimensional arrays, and geolocated parameters are one dimensional arrays, the longitude and latitude data expand to two dimensional arrays the same as the data set if the “With Expand” option is selected. The default is “With Expand”.
- (vi) “Show Satellite”: Display or do not display the location of the satellite on the map projection. If the latitude and longitude of the satellite are available, the position of the satellite will display on the map projection if the “Yes” option is selected. If the satellite position is not available, the “No” option will be automatically set. The default is “Yes”.
- (vii) “Show Sun”: Display or do not display the location of the Sun on the map projection. If the latitude and longitude of the Sun are available, the position of the Sun will display on the map projection if the “Yes” option is selected. If the latitude and longitude are not available, the “No” option will be automatically set. The default is “Yes”.
- (viii) “Redraw Continents”: Redraw or do not redraw the continental boundaries on the map projection. The continental boundaries are drawn before data are displayed and may subsequently be covered by data. If the “Yes” option is selected, the

- continental boundaries will be redrawn after displaying data. The default is “Yes”.
- (ix) “Continents Thickness”: The line thickness used to draw the continental boundaries on the map projection. The default value is 1.0.
 - (x) “Contour Geolocated”: This field is for the “Contour Geolocated” graphic option, see [item \(30\)](#). The options include:
 1. “With Smoothing”: Smooth the data set before creating the contour plot. This option is the default.
 2. “Without Smoothing”: Do not smooth the data set.
 3. “Filter With Smoothing”: Remove any large triangles which return from the TRIANUGLAR function before calling the TRIGRID function. The lengths of any triangles that are greater than five times the length of the diagonal of the grid size are removed. Smooth the data set before creating the contour plot.
 4. “Filter Without Smoothing”: Do not smooth the data set after filtering the triangles that return from the TRIANUGLAR function. See option 3.
 5. “Average With Smoothing”: Create the grided data by calculating the mean value of the data points in each grid. Smooth the data set before creating the contour plot.
 6. “Average Without Smoothing”: Create the grided data by calculating the mean value of data points in each grid. Do not smooth the data set before creating the contour plot.
 - (xi) “Number of Grids for Contour Geolocated”: Set the number of grids for the “Contour Geolocated” graphic option. The default is 360 in longitude and 180 in latitude directions.
 - (xii) “Reread Geolocated Data”: Reread or do not reread the geolocated parameters. When switching from the “With Expand” option to the “Without Expand” option in “Expand Lat-Long” field, or vice versa, the geolocated data need to be reread. The default is “No”.
- (c) “Grid Start”: Select the longitude location of the first grid for “Grid Cell” plot; see [item \(22\)](#). The data are always arranged starting at 90 degrees latitude. The window for this option is shown in [Fig. 4-68](#). The “Grid Start” field includes:
- (i) “Auto”: Set the first grid automatically. If the grid size is equal to one degree, the first grid is set at -180 degrees longitude, otherwise it is set at zero degree longitude. This option is the default.
 - (ii) “0”: Set the first grid starting at zero degree longitude.
 - (iii) “-180”: Set the first grid starting at -180 degrees longitude.

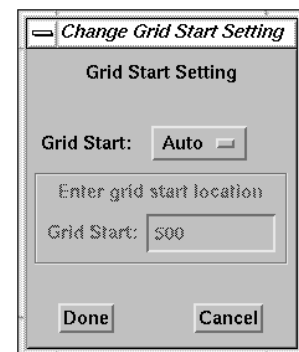


Fig. 4-68. Grid Start Setting Window

- (iv) “Other”: This option can be used to specify the longitude location of the first grid. If this option is selected, the “Enter grid start location” field becomes activated for entering the location. The values are in degrees.
- (d) “Color Bar”: Display or do not display a color bar. This option also allows selection of discrete or continuous mapping of color to data values. The window for this option is shown in Fig. 4-69. The “Color Bar” field includes:
- (i) “Without”: Do not display a color bar.
 - (ii) “Continuous”: Display the data in a continuous color pattern. This option is good for displaying variables with continuous values. This is the default.
 - (iii) “Discrete”: Display the data in a discrete color pattern in the specified number of intervals. If this option is selected, the “Enter number of discrete intervals” field becomes activated for entering the number of intervals. This option is good for displaying variables with discrete values.
- (e) “Style”: Set the line type, symbol type, and symbol size used to display the data. The window for this option is shown in Fig. 4-70. The fields include:
- (i) “Line Type”: Select the line type used to join data points. The available line types are “Solid”, “Dotted”, “Dashed”, “Dashed Dot”, “Dashed Dot Dot Dot”, and “Long Dashes”. The default is “Solid”.
 - (ii) “Symbol Type”: Select line or symbols to display the data. The options in this field include “No Symbol”, “Plus sign”, “Asterisk”, “Period”, “Diamond”, “Triangle”, “Square”, “X”, “Circle”, “FOV”, “Filled Triangle”, “Filled Square”, “Filled Circle”, and “Filled FOV”. The default is “No Symbol”.
 - (iii) “Symbol With Line”: Select to use or not to use a line to connect all the symbols. This field becomes activated if a symbol is selected to display the data. The default is “No”.
 - (iv) “Symbol Size”: Set the size of the symbol to mark the data points. This field becomes activated if a symbol is selected to display the data. The default size is 1.0, which is approximately the same size as a character.

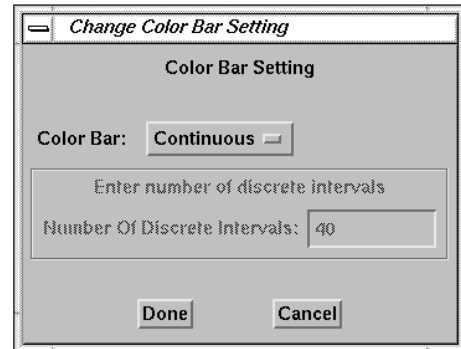


Fig. 4-69. Color Bar Setting Window

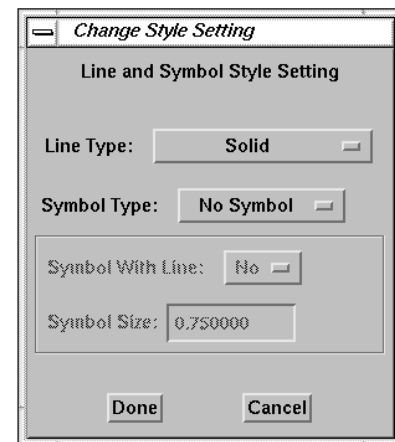


Fig. 4-70. Style Setting Window

- (f) “Fill Data Value”: Change the fill data value. The fill data value can be a positive or a negative value. If the fill data value is positive, any data equal to or greater than the fill value represents bad data. If the fill data value is negative, any data equal to or less than the fill value represents bad data. Those data will not be plotted. If this option is selected, a window, as shown in [Fig. 4-71](#), pops up for entering the new fill data value. The default fill data value is “1.0E+35”. Click the “Done” button after entering a value or the “Cancel” button to cancel this selection.

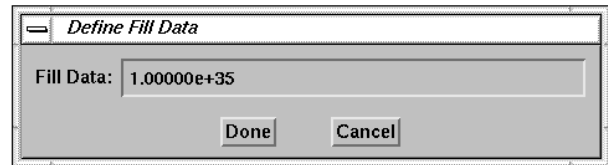


Fig. 4-71. Define Fill Data Window

- (g) “Display Time Type”: Set the X axis to hour, minute, or second if data are plotted against time. The window for this option is shown in [Fig. 4-72](#). The options in the “Display Time Type” field include:

- (i) “Hours”: Set the time to hours of the day.
- (ii) “Minutes”: Set the time to minutes of the day.
- (iii) “Seconds”: Set the time to seconds of the day. This is the default option.

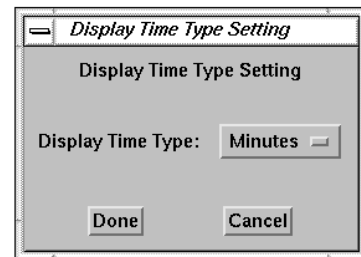


Fig. 4-72. Display Time Type Setting Window

- (h) “Auto Select Scale Factors”: This option is for the “Scale Data Value” function option, see [item \(45\)](#). The window for this option is shown in [Fig. 4-73](#). If “Yes” is selected, the windows for selecting equation, input type, and input values pop up only the first time. The same information will be used when the “Scale Data Value” function is selected again. However, this information will be reset to initial values when a new file is opened. If “No” is selected, these windows pop up every time the “Scale Data Value” function is selected. The default is “No”.

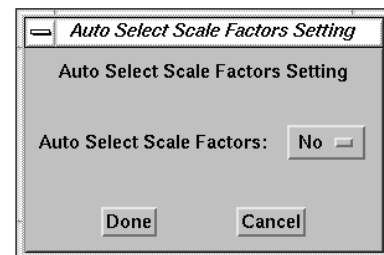


Fig. 4-73. Auto Select Scale Factors Setting Window

- (9) “Help”: Call up this user guide, release note, IDL on-line help menu, or see information about view_hdf. The options are shown in [Fig. 4-74](#).

- (a) “User Guide”: Call up this user guide which is in PDF format. An PDF reader, acroread, is needed.
- (b) “Release Note”: See the release note which includes latest updates for the view_hdf applications since this user guide was completed.

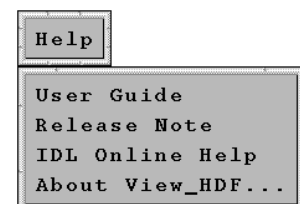


Fig. 4-74. Help Menu

(c) “IDL On-line Help”: Call up the IDL on-line help menu.

(d) “About View_HDF...”: If this option is selected, a window, as shown in Fig. 4-75, pops up to display the URL of the view_hdf applications, the current version number, the date of last update, and contact information. Click on the “Done” button to close this window.

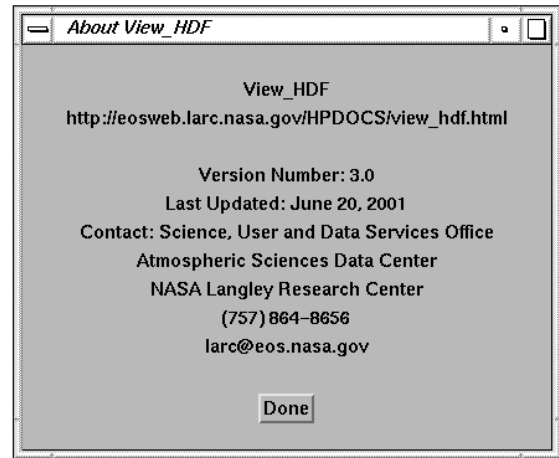


Fig. 4-75. About view_hdf Window

(10) “Current Filename”: Display the name of the current input data file. A file can be opened by entering the filename in this field and pressing the return key. Either a path name or the “*” wildcard character are acceptable input. In the case of the “*” wildcard character, a window will pop up for selecting a file if more than one filename matched. If only one filename matched, that file will be opened.

“

(11) “Switch File”: Switch the current input data file from among the last five files opened in the current session without reopening the file. When this button is clicked, a window listing the last five files opened pops up, from which the user can select a new current input data file.

(12) “INPUT”: Display the names of the SDS and Vdata sets in the current HDF file. The user can set the “Range Type” field to select the range of imported data either by record number or by time, if the time variable is recognized; see Section 5.0 for a list of time variables that are recognized. If the time variable is not recognized, the record number must be used. The options are:

- (a) “Record Number”: Use record number to select the range of data. If this option is selected, the range input windows are as shown in Fig. 3-5 for SDS and Fig. 3-8 for Vdata. The ending values shown initially are the total number of records, or the dimension values for the corresponding ranks. Enter the record range and click the “Done” button or click the “Cancel” button to cancel this selection. “Record Number” is the default.
- (b) “Time”: Use time to select the range of data if the time variable (See Section 5.0) is recognized. If the time variable is not recognized, “Record Number” is automatically used for the range type. If the “Time” option is selected, a window, as shown in Fig. 4-76, pops up for entering the time range. The starting time initially shown is the time of

The image shows a dialog box titled "Subset Data". It contains the following fields and controls:

- Subset Name:** CERES TOT Filtered Radiances Upwards[0]
- Starting Time:** 15:00:04 (with an unchecked checkbox to its left)
- Ending Time:** 19:59:56 (with an unchecked checkbox to its left)
- Julian Starting Time:** 2451050.1250560 (with an unchecked checkbox to its left)
- Julian Ending Time:** 2451050.3332927 (with an unchecked checkbox to its left)
- Buttons:** Done, Reset, and Cancel at the bottom.

Fig. 4-76. Time Range Input Window

the first record and the ending time is the time of the last record. The user can choose to use either clock time format, the upper line, or Julian date time format, the lower line, to enter the time range by clicking the button in front of the option. Enter the time range and click the “Done” button. The record range input window, as shown in [Fig. 3-5](#) for SDS or [Fig. 3-8](#) for Vdata, will pop up with the corresponding record numbers shown. The user can change the record range. Click the “Done” button to finish this selection or the “Cancel” button to cancel this selection.

The options “Do Not Display Attributes”, “Display Attributes”, and “Display Attributes Only” are for displaying the attributes of the data or not displaying the attributes when the data set is selected. Click on any of these data set names to import the data to the Current Subsets field. This procedure is described in [Section 3.0: How to Start](#). If the “Display Attributes” option is selected, the attributes of the data set will be displayed in an editor window along with the Range Input Window, as shown in [Fig. 4-77](#).

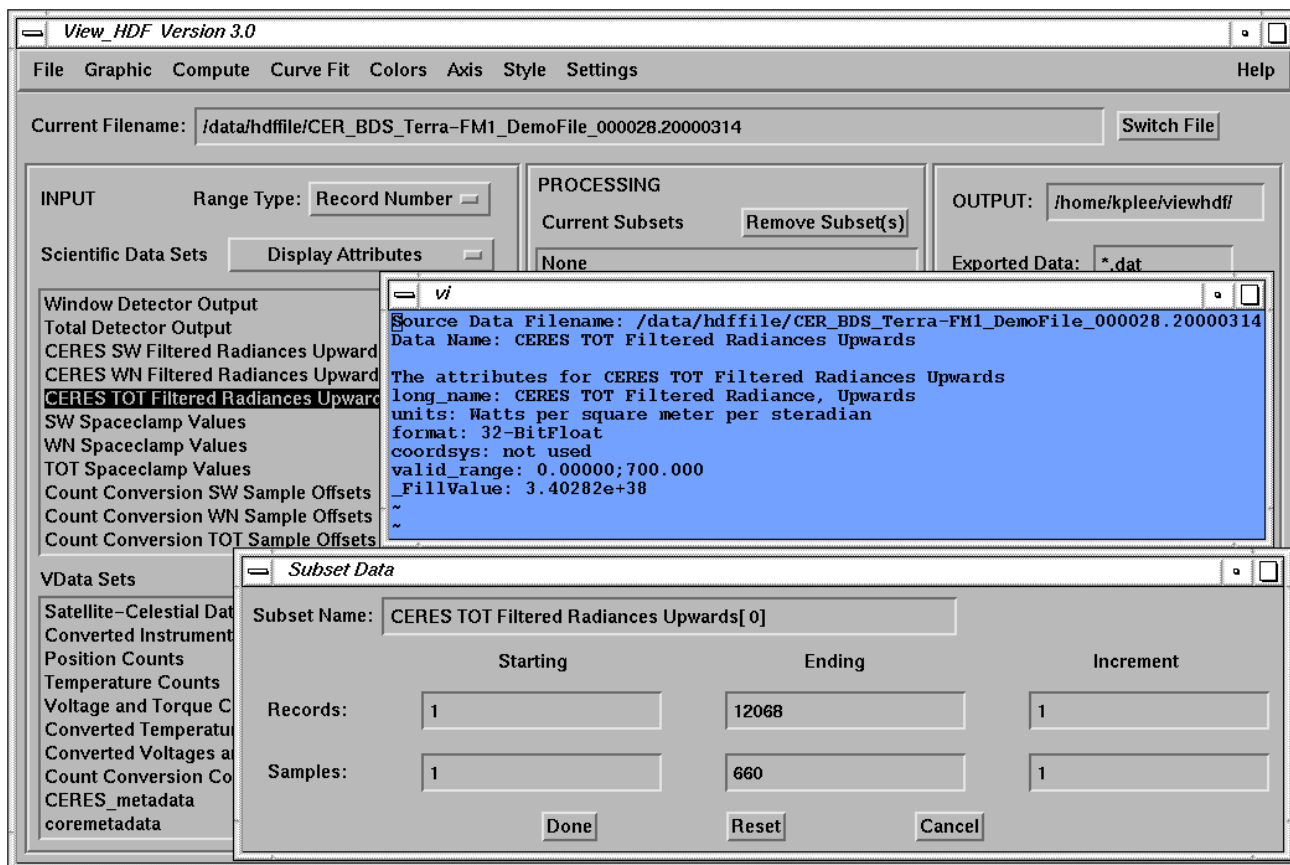
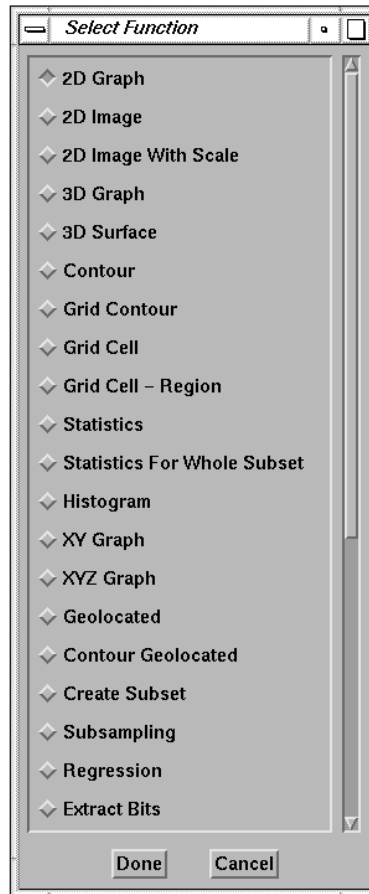


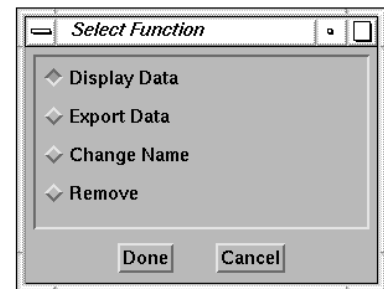
Fig. 4-77. Display Data Attributes

- (13) “PROCESSING”:
Display the names of the imported data sets. These data sets can be accessed for plotting, displaying, or exporting. Click on any subset data in this list and a function menu, as shown in Fig. 4-78, pops up. Choose the selection and click the “Done” button. To cancel this selection, click the “Cancel” button.

The menu shown in Fig. 4-78a is for numerical data and the menu shown in Fig. 4-78b is for text data. Descriptions of these menus are given in Section 4.2: Select Function Menu.



(a) For Numerical Data



(b) For Text Data

Fig. 4-78. Select Function Menu

The “Remove Subset(s)” button is for removing some or all of the imported data in the Current Subsets list. The procedure is similar to “Multi Y Variables”; see item 2(a)

- (14) “OUTPUT”: List the names of files in the output directory that match the current export data filter. The current output directory path is displayed. The filter can be changed to refine the list. After changing the filter, press the return key to update the output list. The “Change Preferences” option in the “File” menu can be used to specify the output directory; see item 1(i) or edit the output directory path in the OUTPUT column and press the return key to change the directory. The list of files which match the file filter will be updated automatically. Click on any file in this list and a window, as shown in Fig. 4-79, pops up to display or remove the file. “Display Data” displays the contents of the file on the screen using the selected editor. “Remove” deletes the file permanently.

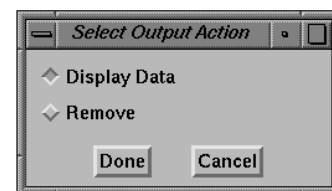


Fig. 4-79. Output Action Window

4.2 Select Function Menu

This section describes the different graph styles from the “Select Function” menu ([Fig. 4-78](#)):

- (15) “2D Graph”: Plot data against the index of the data array. An example of a 2D plot is shown in [Fig. 3-11](#). This is the default.
- (16) “2D Image”: Display data as an image.
- (17) “2D Image With Scale”: This option is the same as “2D Image” except the data set will be interpolated to fit the size of view window before displaying the data as an image.
- (18) “3D Graph”: Draw a wire-mesh representation of a two-dimensional array projected onto two dimensions. The plot is generated as a function of the array index of each element of data.
- (19) “3D Surface”: Creates a shaded-surface representation of a gridded surface with shading from a light source model. The surface is generated as a function of the array index of each element of data. An example of a 3D surface plot is shown in [Fig. 4-80](#)

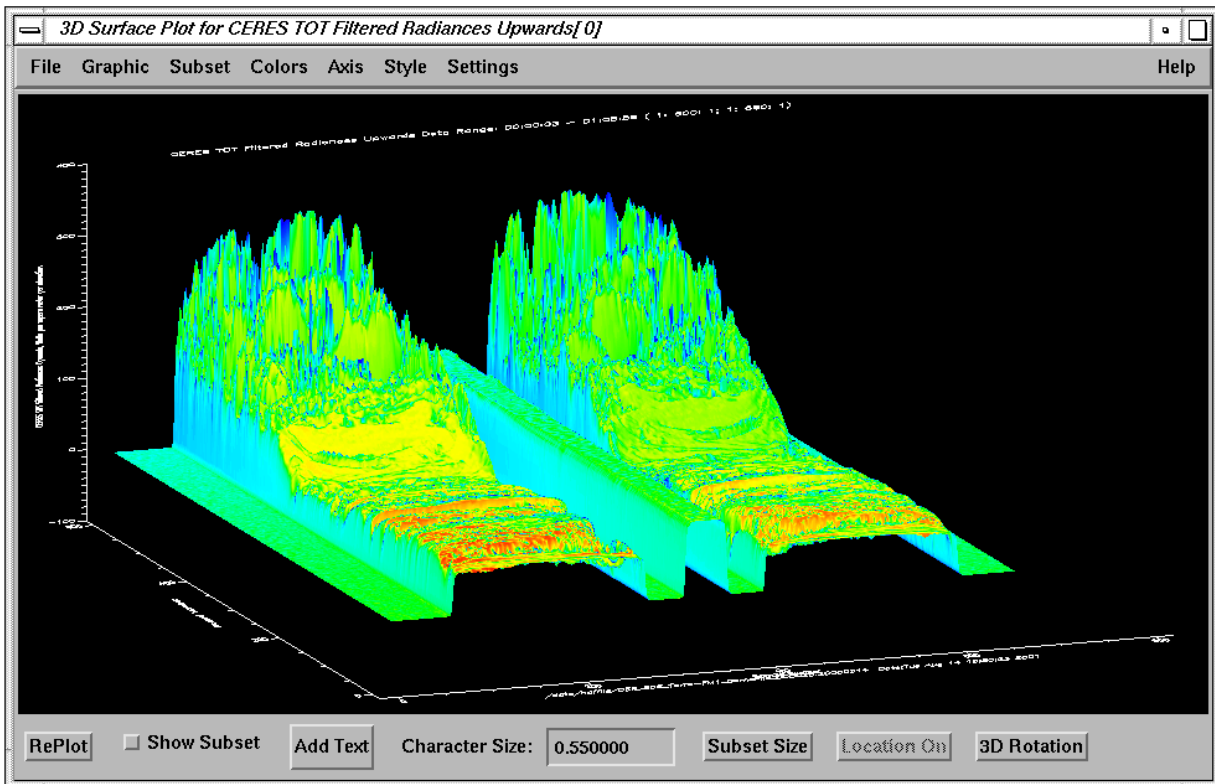


Fig. 4-80. 3D Surface graph

- (20) “Contour”: Draw a line contour plot from the data. The contour is plotted as a function of the two-dimensional array index of each element of data.
- (21) “Grid Contour”: Create a filled contour plot on a map projection. The gridded data are arranged into a two or three dimensional array. For a two dimensional array, the first dimension is latitude, and the second is longitude. For example, for a 2.5 degree grid in latitude and longitude, the dimensions of the data array are 72x144. For a three dimensional array, the first dimension is the index of the two dimensional grid. For example, for a 24 hour data set with 2.5 degrees grid in latitude and longitude, the dimensions of the data array are 24x72x144. If the data array is three dimensional, it will continuously display the plot by increasing the first dimension index. A window, as shown in [Fig. 4-81](#), pops up. Click the “Yes” button to display the next plot, click the “No” button to skip the next plot, or click the “Cancel” button to stop the increment. See [item 8\(c\)](#) for a description of how the gridded data are arranged. A color bar displays the scale value.

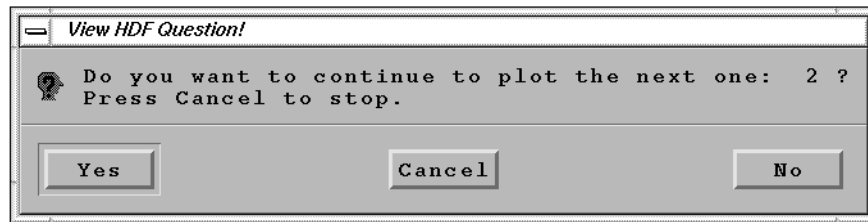


Fig. 4-81. Question for Displaying Next Plot

- (22) “Grid Cell”: Display gridded data by region on a map projection. The gridded data are arranged in the same way as for “Grid Contour”. A region is represented by one grid cell. The data value for each region is displayed with the color of the scaled data. This option can also display zonal regions if the dimension of the longitude is set to 1. A color bar shows the scale values. An example of a grid cell plot is shown in [Fig. 4-82](#).

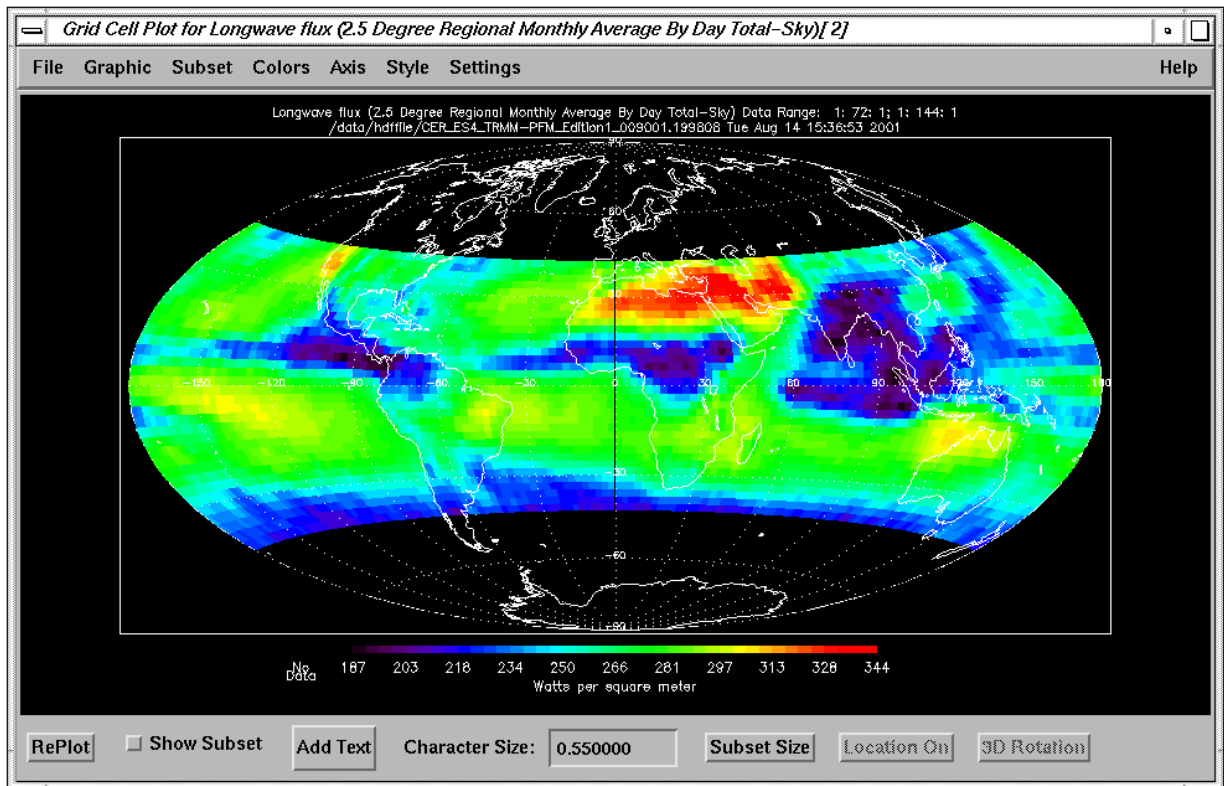


Fig. 4-82. Grid Cell Plot

- (23) “Grid Cell - Region”: This option is similar to “Grid Cell”, [item \(22\)](#), except the gridded data are arranged by region number instead of by latitude and longitude. The corresponding region numbers are stored in a different variable array which has already been imported into the Current Subset list before this option is selected. If this option is selected, a window, as shown in [Fig. 4-83](#), pops up for selecting the region number from the Current Subset list and the grid size. Click the “Done” button after selecting the variable. A plot similar to [Fig. 4-82](#) will be displayed on the screen. Click the “Cancel” button to cancel this selection.

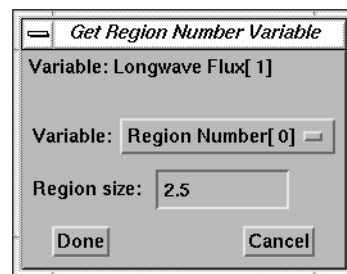


Fig. 4-83. Get Region Number Variable

- (24) “Statistics”: Calculate the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays. A vdata set is considered as two-dimensional array if its order is greater than one. If the data are in a two-dimensional array, the statistics parameters are obtained for all elements from the first dimension on each second dimension array index. For example, a 12891x600 data array results in five arrays with a dimension of 600 each. Each array is for one statistics parameter. Each element of these arrays is the result for 12891 samples. The results are written to a file. A window, as shown in Fig. 4-84, pops up for entering the filename.

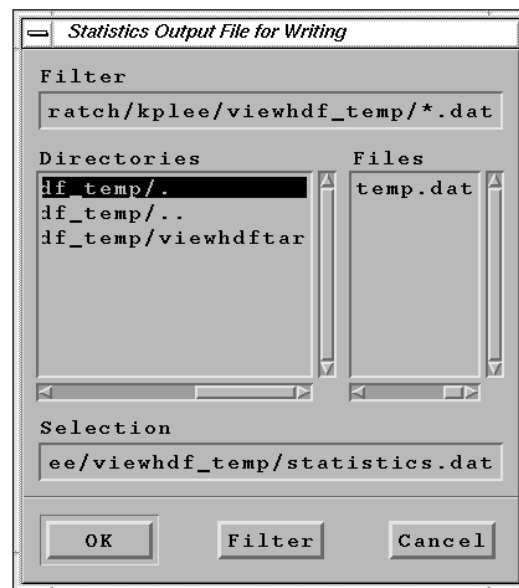


Fig. 4-84. Enter Filename Window

The results are also displayed in an editor window on the screen. Figure 4-85 shows an example of the statistics results for a two-dimensional array.

Sample	N	StdDev	Mean	Maximum	Minimum
0	4974	12.29912	54.65568	72.99381	19.96134
1	4910	12.56383	56.81154	74.79243	19.96833
2	4853	12.65323	58.34836	76.10797	20.11804
3	4802	12.65366	59.58869	77.42385	21.76154
4	4762	12.62513	60.68395	77.71209	22.00075
5	4721	12.54421	61.62635	78.08744	21.70827
6	4684	12.48248	62.38721	78.87113	22.16004
7	4652	12.44380	63.02293	79.59893	23.37402
8	4621	12.41571	63.59050	79.87986	23.82837
9	4593	12.39859	64.09680	80.45180	24.54479
10	4566	12.39189	64.59913	80.90702	24.26234
11	4544	12.38614	65.10441	81.34067	23.94783
12	4517	12.34688	65.59363	82.15977	24.14688
13	4495	12.27782	66.05082	83.34460	23.81365
14	4475	12.17010	66.50985	84.02313	23.03619

Fig. 4-85. Display Statistics Result

A plot, as shown in Fig. 4-86, with mean and standard deviation, will display results for a two-dimensional array on the screen. A plot is not produced for one-dimensional array.

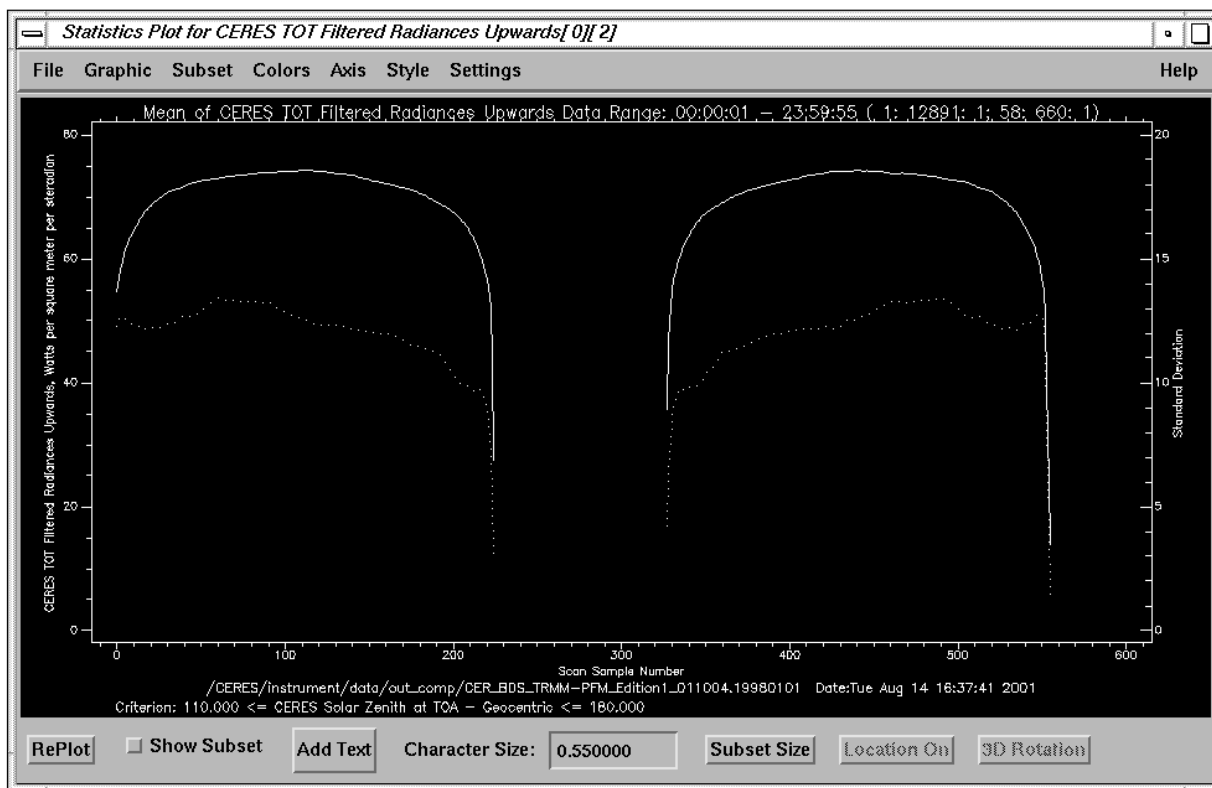


Fig. 4-86. Mean and Standard Deviation Plot

The results are also placed in the Current Subsets list, as shown in Fig. 4-87.

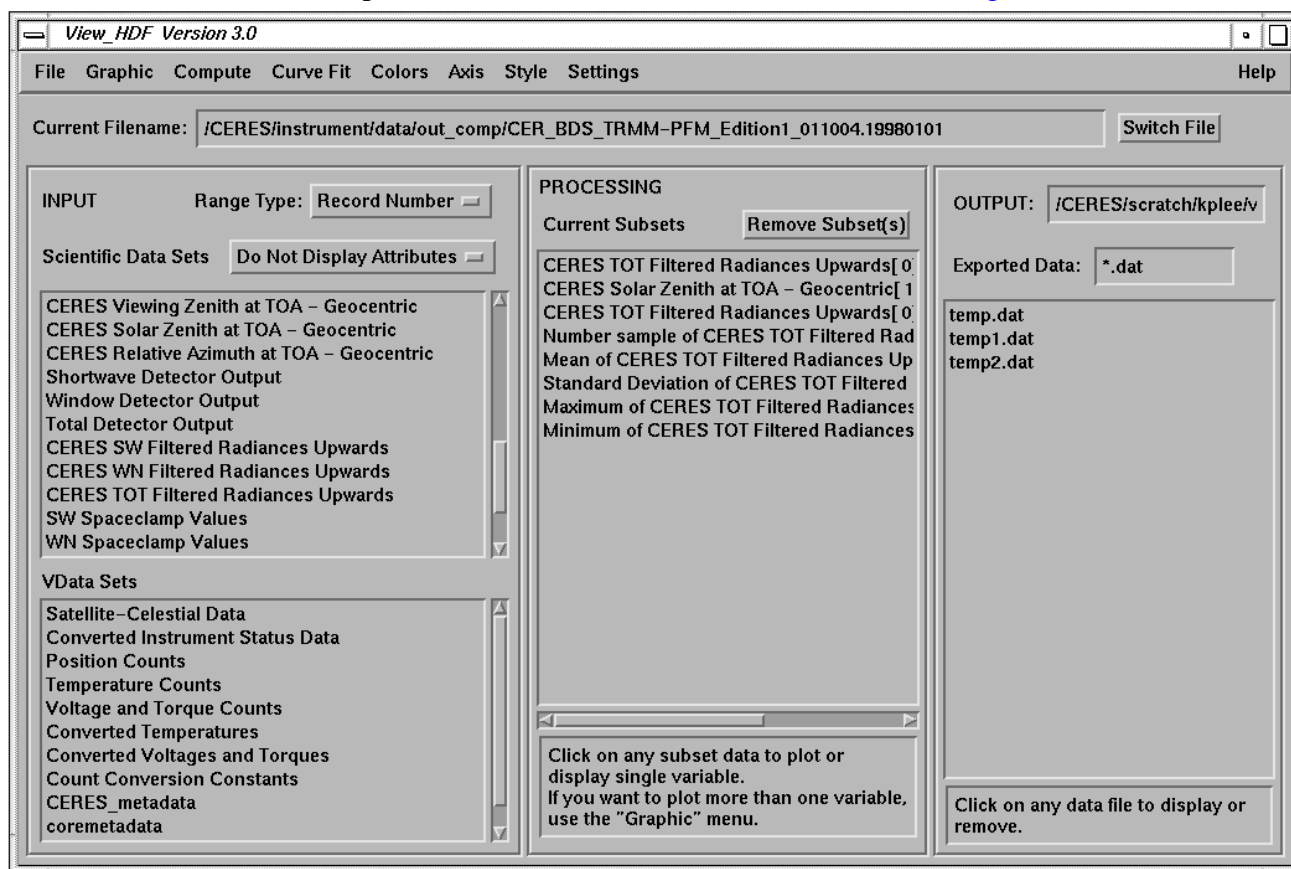


Fig. 4-87. Statistics Parameters in Current Subsets

- (25) “Statistics For Whole Subset”: Calculate the mean, standard deviation, maximum, minimum and number of samples for a whole array. The results are written to a file, as shown in Fig. 4-88.

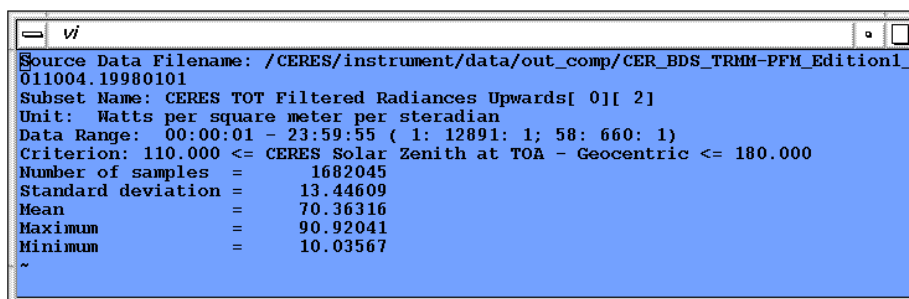
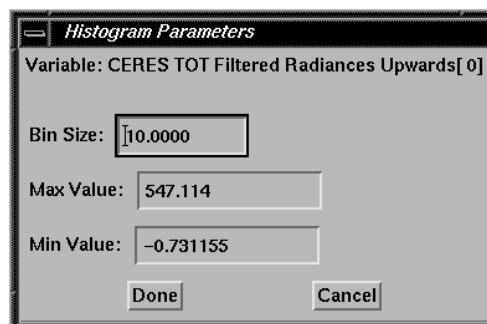


Fig. 4-88. Statistics For Whole Subset Result

- (26) “Histogram: Create a sample histogram of the data with the option to write the results to a file. If this option is selected, a window, as shown in Fig. 4-89, pops up for entering “Bin Size”, the size of bin, “Max Value”, the maximum value, and “Min Value”, the minimum value of the histogram. After entering the values, click the “Done” button.

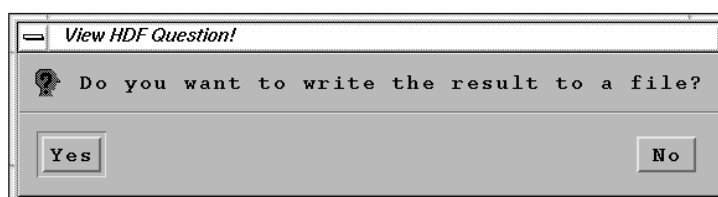


The window is titled "Histogram Parameters". It contains the following fields and buttons:

- Variable: CERES TOT Filtered Radiances Upwards[0]
- Bin Size: 10.0000
- Max Value: 547.114
- Min Value: -0.731155
- Buttons: Done, Cancel

Fig. 4-89. Histogram Parameters Window

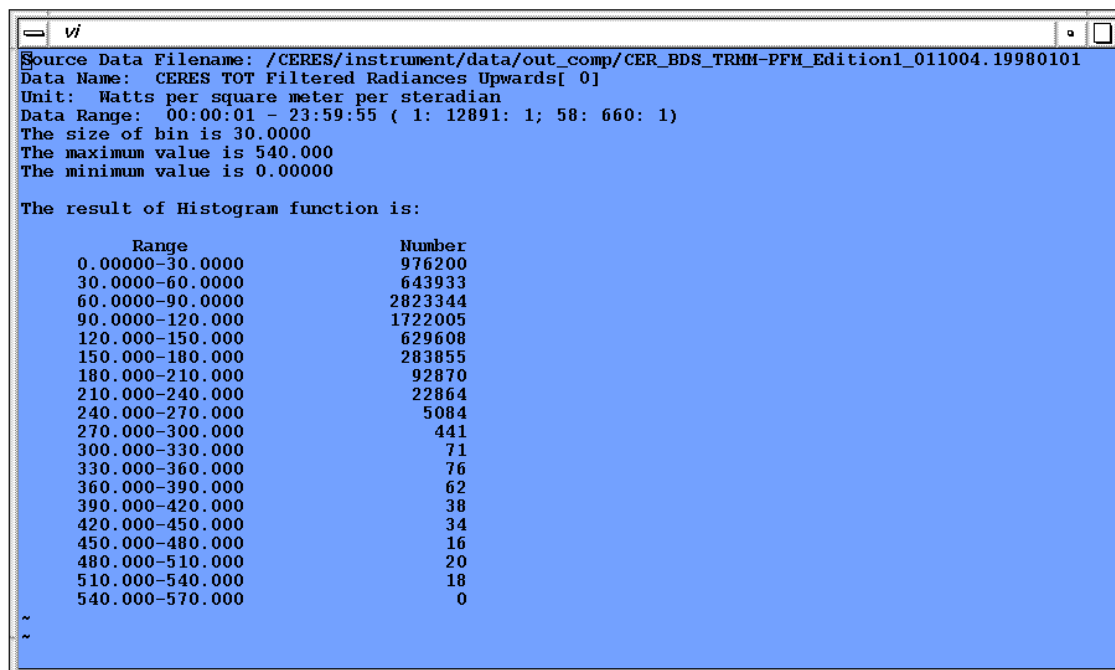
Another window, as shown in Fig. 4-90, pops up asking whether to write the results to a file. Click the “Yes” button to write the results to a file. A sample result and a plot of the histogram are shown on Fig. 4-91 and Fig. 4-92.



The window is titled "View HDF Question!". It contains the following text and buttons:

- Do you want to write the result to a file?
- Buttons: Yes, No

Fig. 4-90. Question for Writing Result to a File



The window is titled "vi". It displays the following information:

Source Data Filename: /CERES/instrument/data/out_comp/CER_BDS_TRMM-PFM_Edition1_011004.19980101
 Data Name: CERES TOT Filtered Radiances Upwards[0]
 Unit: Watts per square meter per steradian
 Data Range: 00:00:01 - 23:59:55 (1: 12891; 1; 58: 660; 1)
 The size of bin is 30.0000
 The maximum value is 540.000
 The minimum value is 0.00000

The result of Histogram function is:

Range	Number
0.00000-30.0000	976200
30.0000-60.0000	643933
60.0000-90.0000	2823344
90.0000-120.000	1722005
120.000-150.000	629608
150.000-180.000	283855
180.000-210.000	92870
210.000-240.000	22864
240.000-270.000	5084
270.000-300.000	441
300.000-330.000	71
330.000-360.000	76
360.000-390.000	62
390.000-420.000	38
420.000-450.000	34
450.000-480.000	16
480.000-510.000	20
510.000-540.000	18
540.000-570.000	0

Fig. 4-91. Histogram Result

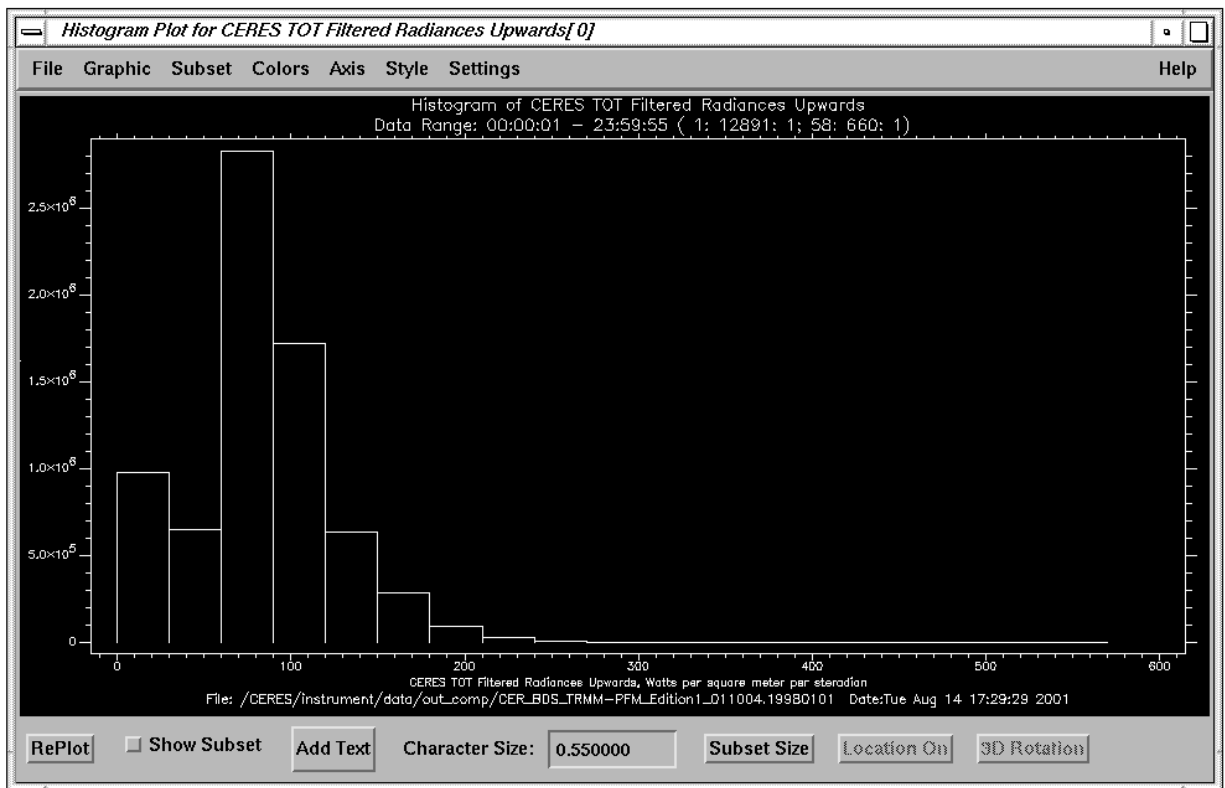


Fig. 4-92. Histogram Result Plot

- (27) “XY Graph”: Display data against time, sample number, record number, or packet number if these variables are recognized; see [Section 5.0](#) for variables that are recognized. The X variable can also be selected from the Current Subsets list. A window, as shown in [Fig. 4-93](#), pops up for selecting the X field variable. Click the “X Fields Selection” button.

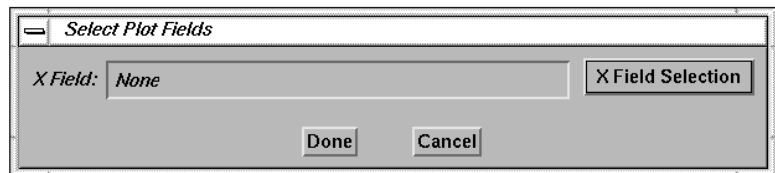


Fig. 4-93. Select X Field Window

A list, as shown in [Fig. 4-94](#), displayed for selecting the X field. After the X Field Selection has been made, click the “Done” button to close the window. If “Select Variable” is selected, another window will pop up for selecting the X variable from the Current Subsets list.

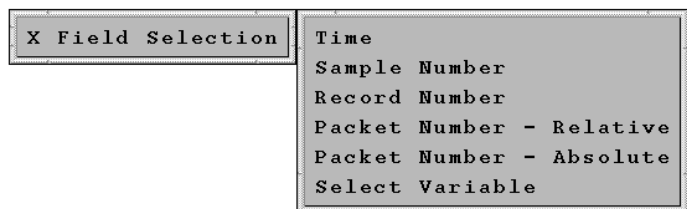


Fig. 4-94. X Field List

- (28) “XYZ Graph”: Display data (Z) against two variables (X,Y) from the Current Subsets list. The data values are represented by color. A window, as shown in [Fig. 4-95](#), pops up for selecting the X and Y variables. After selecting the variables, click the “Done” button.

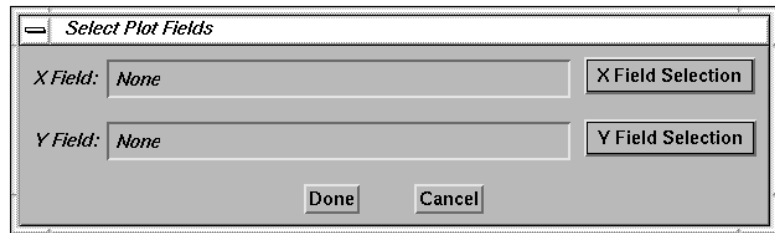


Fig. 4-95. Select X and Y Field Window

- (29) “Geolocated”: Display data on a map projection. The geolocation parameters are imported from the current file automatically if they can be recognized; see [Section 5.0](#) for geolocation parameters that are recognized. Otherwise, a window, as shown in [Fig. 4-96](#), pops up for selecting geolocation parameters from the Current Subsets list. If the geolocation parameters are already imported into the Current Subsets list, click “Yes” to select these variables. A window, as shown in [Fig. 4-67](#), pops up for entering the parameters. Either latitude or colatitude position of the data can be selected. Also, the positions of the satellite or the Sun can be selected if available. After selections have been made, click the “Done” button, or click the “Cancel” button to close the window. An example of a geolocated plot is shown in [Fig. 4-97](#).

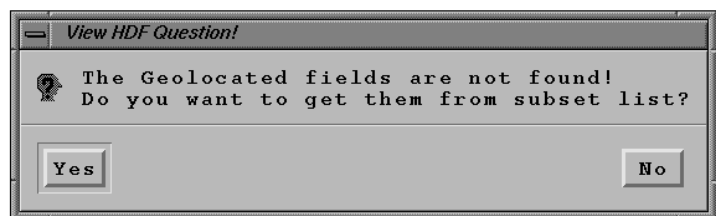


Fig. 4-96. Question for Getting Geolocated Parameters

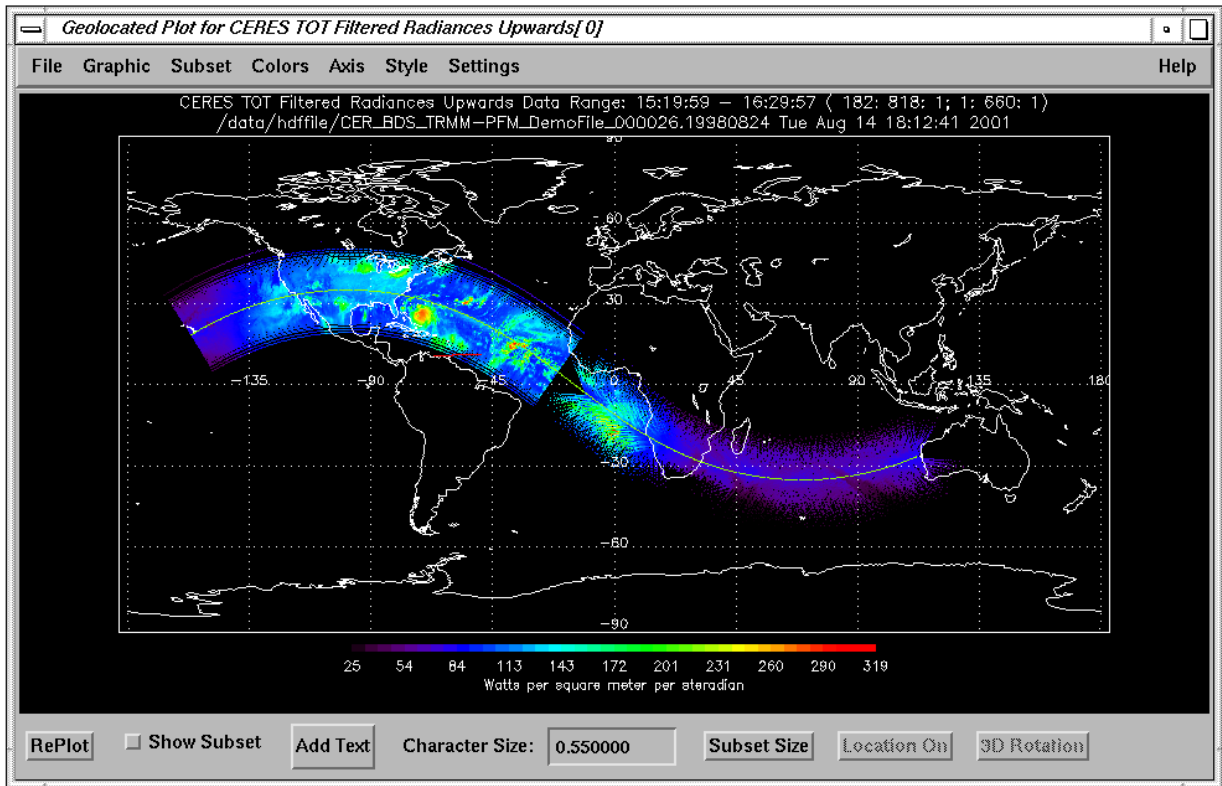


Fig. 4-97. Geolocated Plot

- (30) “Contour Geolocated”: This option is similar to the “Geolocated” graphic option, see [item \(29\)](#). Instead of plotting the data point by point on a map projection with the corresponding geolocated parameters, a filled contour is created and plotted on a map projection. The data will be converted into a two-dimensional regular grid before a contour is created. The default size of grid is 360 cells in longitude and 180 cells in latitude. The user can change these values by using the “Number of Grids for Contour Geolocated” field under the “Map” option in the “Settings” menu; see [item 8\(b\)](#). There are also six options in the “Contour Geolocated” field under the “Map” option to adjust the contour; see [item 8\(b\)](#). An example of a contour geolocated plot with the “Filter With Smoothing” option is shown in [Fig. 4-98](#).

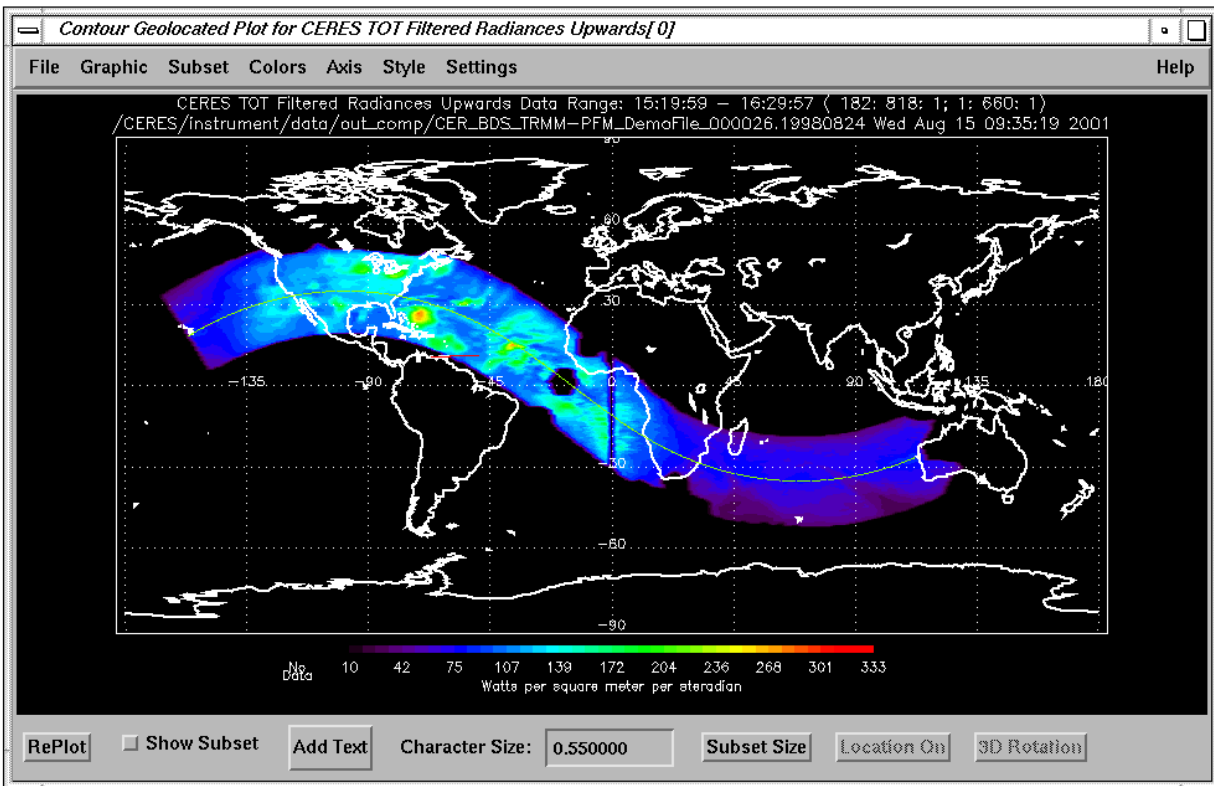


Fig. 4-98. Contour Geolocated Plot

- (31) “Create Subset”: Create a subset of the selected variable based on the value of another criterion variable. The criterion data should be read into the Subset list before using this option. A criterion window, as shown in Fig. 4-99, pops up for selecting the criterion variable and the range. The “Inside the range” option includes data within the minimum and maximum values of the criterion variable. The “Outside the range” option includes data less than the minimum value or greater than the maximum value of criterion variable. The default is “Inside the range”. Click the “Done” button after selecting the proper values. A window will pop up for entering the name of the variable for the result of this operation, as shown in Fig. 4-27. A subset of the selected variable is created and put into the Current Subsets list, as shown in Fig. 4-100. This subset variable can be accessed just as any other variable. Another subset can be created from this subset. Note that the out-of-range data are not removed, but are set to fill data. Fill data are not plotted.

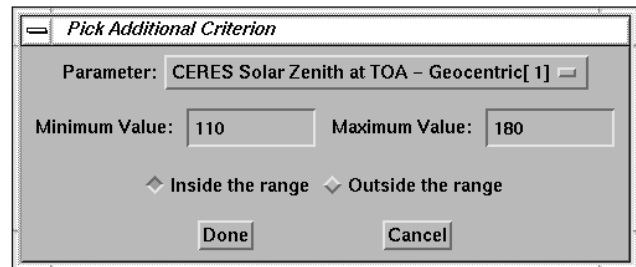


Fig. 4-99. Get Criterion Window

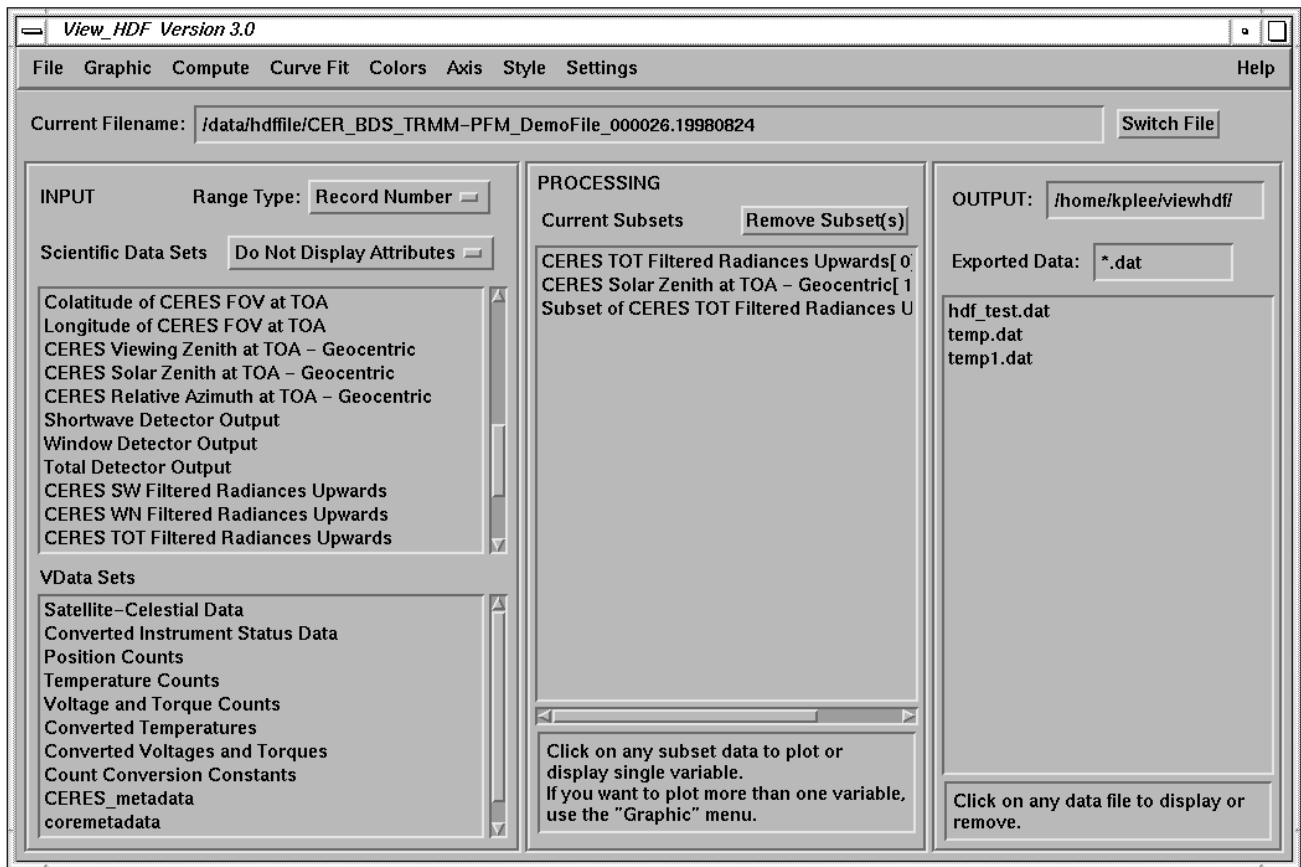


Fig. 4-100. Name of Subset Data

Figure 4-101 shows the plot generated with the “Create Subset” option (compare with Fig. 3-11 for a plot of the unsubsetted data). The criterion is written on the lower part of the plot area.

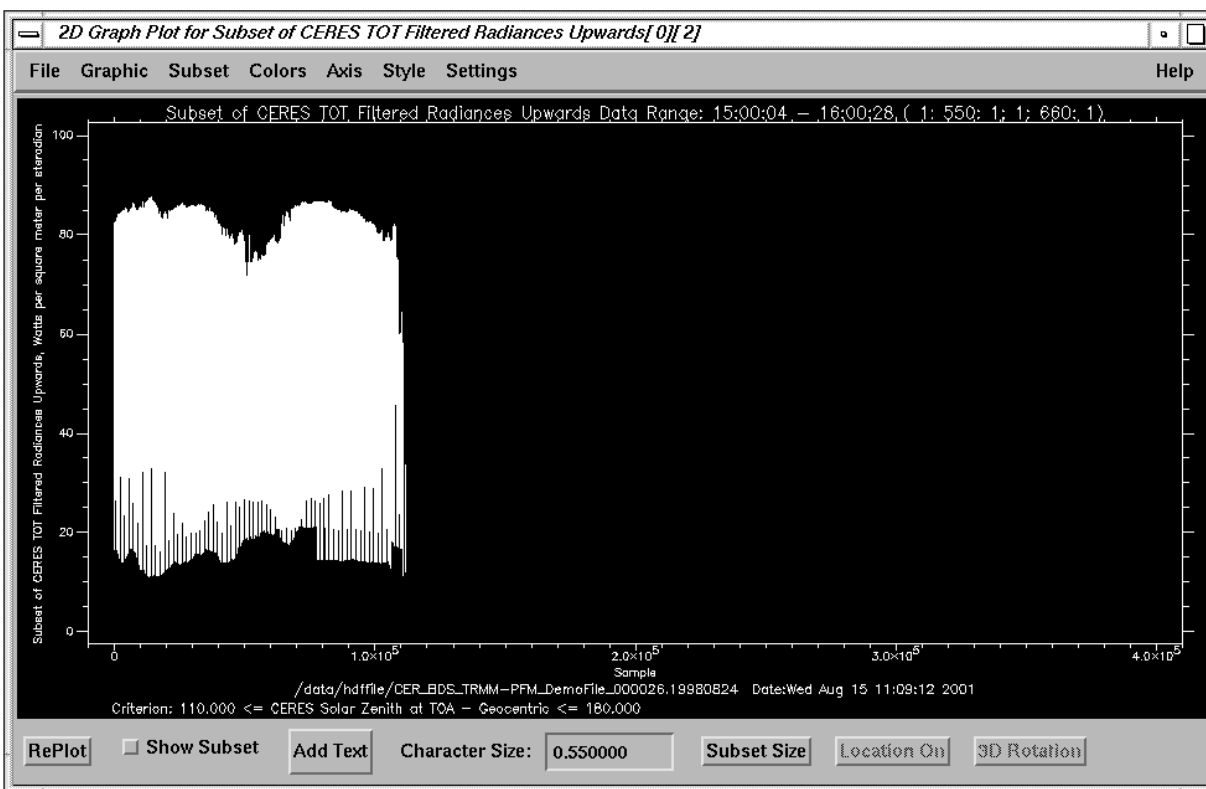


Fig. 4-101. 2D Plot with Criterion

- (32) “Subsampling”: Subset the data set already imported into Current Subsets list. A window, as shown in Fig. 4-102, pops up with the dimension of the data. The dimension of the data is the current dimension in IDL format and is not relative to the original. The default variable name can be changed in the “Variable Name” field. After finishing the input, click the “Done” button. The new subsampling variable is added into Current Subsets list.

Fig. 4-102. Enter Subsample Dimensions Window

- (33) “Regression”: Do a multiple linear regression fit. The calculated values and errors for the regression fit are added into the Current Subset list. The coefficients can optionally be written to a file. A window, as shown in [Fig. 4-103](#), pops up for selecting the independent variables which have already been imported in the Current Subset list. “Time”, the time of the day, and “Sample”, the index of the data array, are added to the list. One or more independent variables can be selected. Click the “Done” button after selecting the variable(s). A procedure similar to “Curve Fit”; see [item \(4\)](#), is used which asks for the name of the variable for a calculated result, writes the result to a file, and plots the result and errors. A sample result and plot are shown in [Fig. 4-104](#) and [Fig. 4-105](#)

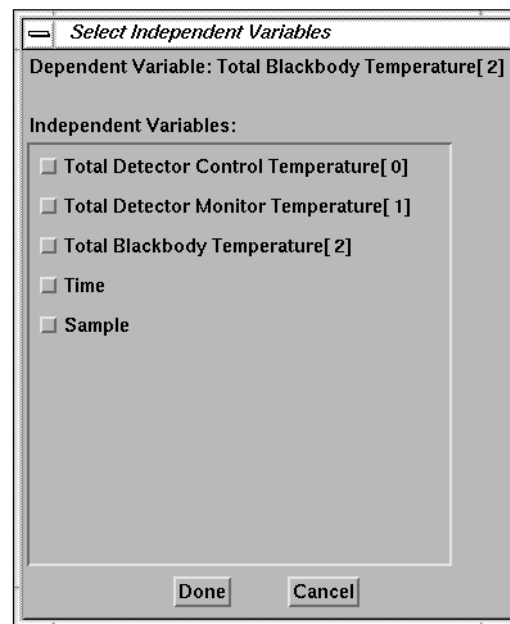


Fig. 4-103. Select Independent Variable Window

```

Source Data Filename: /data/hdffile/CER_BDS_TRMM-PFM_DemoFile_000026.19980824
Data Name: Total Blackbody Temperature[ 2]
Unit: degrees centigrade
Data Range: 15:00:04 - 19:59:56 (1:2727:1; Order: 1:12:1)
The regression equation is:

Y = 162.86661 - 5.7731826 X1 + 2.0140289 X2

Y = Total Blackbody Temperature, degrees centigrade
X1 = Total Detector Control Temperature, degrees centigrade
X2 = Total Detector Monitor Temperature, degrees centigrade

Multiple correlation coefficient = 0.89455807

Linear correlation coefficient for X1 = -0.79079656
Linear correlation coefficient for X2 = 0.33146120
~
~

```

Fig. 4-104. Regression Fit Result

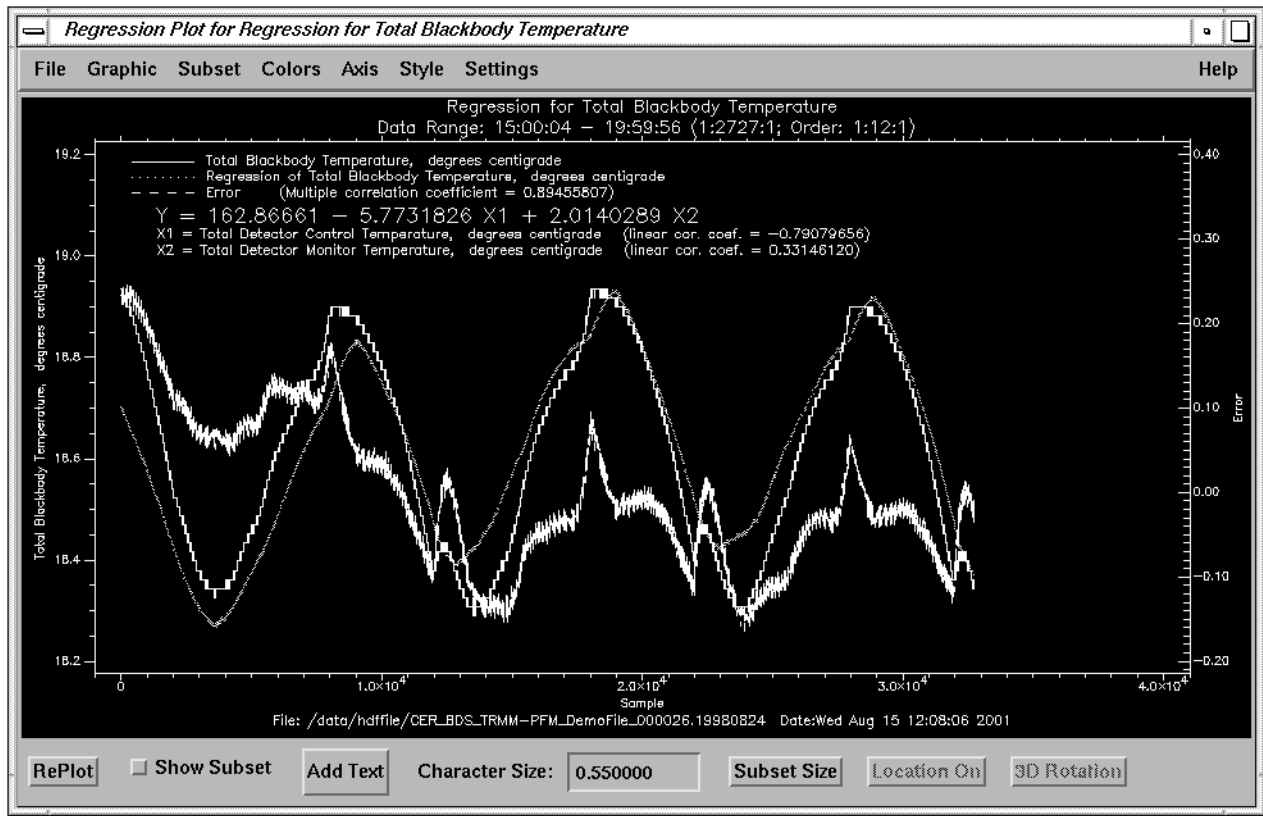


Fig. 4-105. Regression Fit Plot

- (34) “Extract Bits”: Extract specific contiguous bits from an integer variable. See [item 3\(p\)](#).
- (35) “Browse Image”: Display a two-dimensional data array with two one-dimensional arrays, X and Y variables. The number of elements of the X variable is equal to the number of elements of the first dimension, and the number of elements of the Y variable is equal to the number of elements of the second dimension. A window, as shown in [Fig. 4-18](#), pops up for selecting the X and Y variables. The “Profile Number” in “X Field Selection” is the index of the first dimension of the data, and the “Slab Number” in “Y Field Selection” is the index of the second dimension of the data. An example of a browse image is shown in [Fig. 4-106](#).

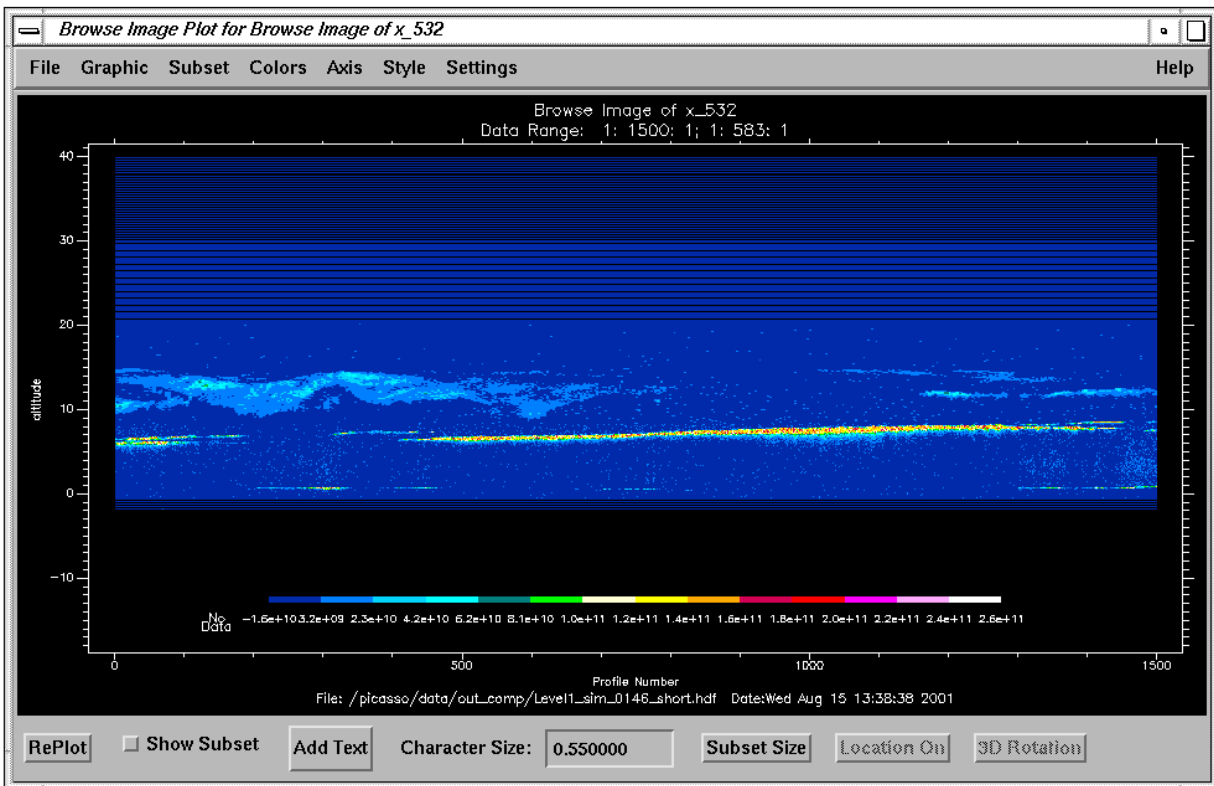


Fig. 4-106. Browse Image Plot

- (36) “Browse Image With Average”: This option is similar to the “Browse Image” graphic option, see [item \(35\)](#). Instead of plotting every profile, the index of the first dimension of the data set, this option allows the user to calculate an average for any number of profiles before plotting the result. A window, as shown in [Fig. 4-107](#), pops up for entering the number of profiles to be averaged. Click the “Done” button after entering the value or the “Cancel” button to cancel this selection.

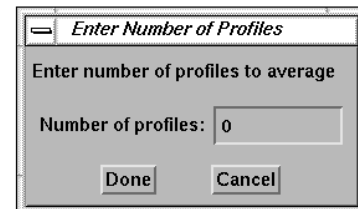
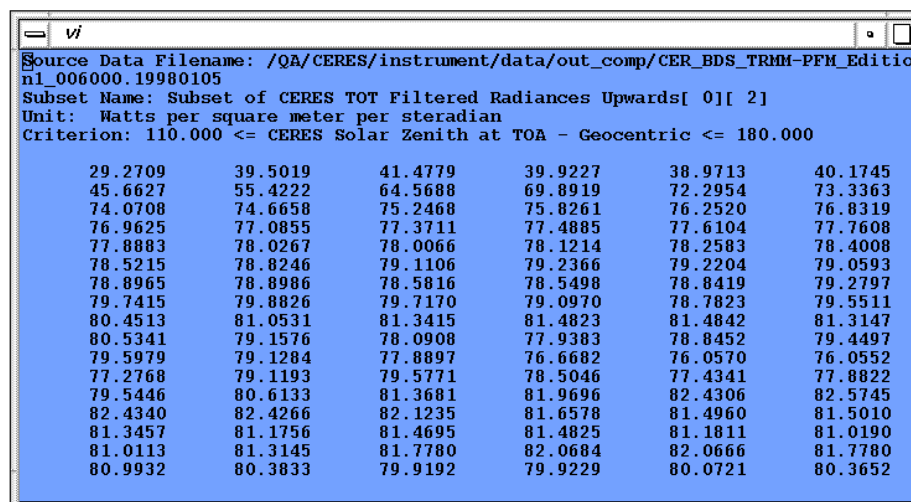


Fig. 4-107. Enter Number of Profile Window

- (37) “Transpose”: Transpose a two-dimensional data array. A window, as shown in [Fig. 4-27](#), pops up for entering the new variable name. As described in the “Statistics” option, see [item \(24\)](#), for a two-dimensional array, the statistics parameters are obtained for all elements from the first dimension on each second dimension array index. However, if the statistics parameters are needed for all elements from the second dimension on each first dimension array index, the two-dimensional data array needs to be transposed before the “Statistics” option is selected. Note: A vdata set with order greater than 2 is treated as a two-dimensional array.

- (38) “Display Data”: Display data on the screen in an edit window. The currently selected editor is used; see [item 1\(i\)](#). An example using the vi editor to display data is shown in [Fig. 4-108](#).



```

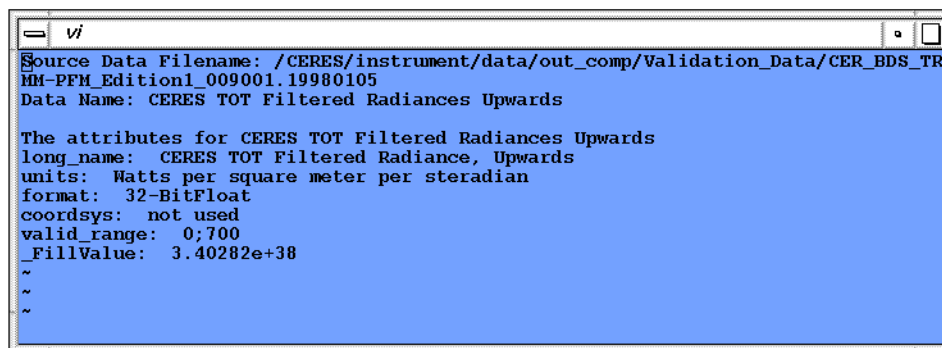
vi
Source Data Filename: /QA/CERES/instrument/data/out_comp/CER_BDS_TRMM-PFM_Editio
nl_006000.19980105
Subset Name: Subset of CERES TOT Filtered Radiances Upwards[ 0][ 2]
Unit: Watts per square meter per steradian
Criterion: 110.000 <= CERES Solar Zenith at TOA - Geocentric <= 180.000

29.2709    39.5019    41.4779    39.9227    38.9713    40.1745
45.6627    55.4222    64.5688    69.8919    72.2954    73.3363
74.0708    74.6658    75.2468    75.8261    76.2520    76.8319
76.9625    77.0855    77.3711    77.4885    77.6104    77.7608
77.8883    78.0267    78.0066    78.1214    78.2583    78.4008
78.5215    78.8246    79.1106    79.2366    79.2204    79.0593
78.8965    78.8986    78.5816    78.5498    78.8419    79.2797
79.7415    79.8826    79.7170    79.0970    78.7823    79.5511
80.4513    81.0531    81.3415    81.4823    81.4842    81.3147
80.5341    79.1576    78.0908    77.9383    78.8452    79.4497
79.5979    79.1284    77.8897    76.6682    76.0570    76.0552
77.2768    79.1193    79.5771    78.5046    77.4341    77.8822
79.5446    80.6133    81.3681    81.9696    82.4306    82.5745
82.4340    82.4266    82.1235    81.6578    81.4960    81.5010
81.3457    81.1756    81.4695    81.4825    81.1811    81.0190
81.0113    81.3145    81.7780    82.0684    82.0666    81.7780
80.9932    80.3833    79.9192    79.9229    80.0721    80.3652

```

Fig. 4-108. Display Data

- (39) “Display Attribute”: Display the attributes of the data set on an editor window. A sample display is shown in [Fig. 4-109](#).



```

vi
Source Data Filename: /CERES/instrument/data/out_comp/Validation_Data/CER_BDS_TR
MM-PFM_Edition1_009001.19980105
Data Name: CERES TOT Filtered Radiances Upwards

The attributes for CERES TOT Filtered Radiances Upwards
long_name: CERES TOT Filtered Radiance, Upwards
units: Watts per square meter per steradian
format: 32-BitFloat
coordsys: not used
valid_range: 0;700
_FillValue: 3.40282e+38
~
~
~

```

Fig. 4-109. Display Data Attributes

- (40) “Export Data”: Export data to a file. A window, as shown in [Fig. 4-110](#), pops up for entering the path and name of a file where the data are to be written. Click “OK” after entering the file name. The output format can be changed by using the “Format” option; see [item 1\(i\)](#).
- (41) “Export Data Without Filldata”: This option is the same as the “Export Data” option, see [item \(40\)](#), except the fill data values are not written to the file.

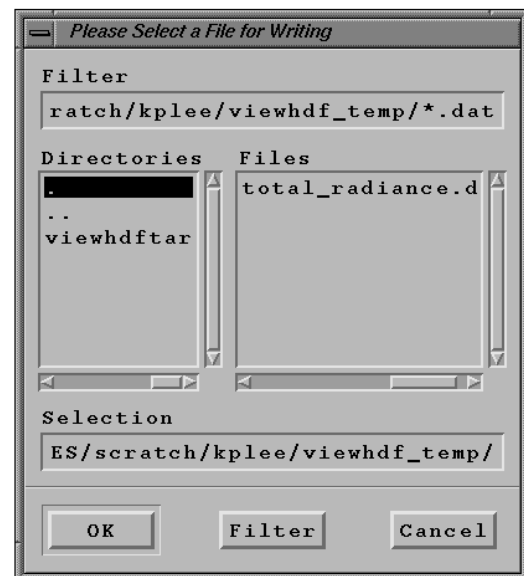


Fig. 4-110. Enter Export File Window

- (42) “Change Name”: Change the name of a variable in the Current Subsets list. A window, as shown in [Fig. 4-27](#), will pop up for entering the new variable name if this option is selected. The “Clear” button clears the name field in the window. The new variable name will replace the old variable name in Current Subsets list.
- (43) “Change Data Type”: Change the data type of a variable in the Current Subsets list. if this option is selected, a window, as shown in [Fig. 4-111](#), pops up for selecting the new data type. The original data type of the data set is also shown in the window. Click the new data type to change the data type of the data set or click the “Cancel” option to cancel this selection.

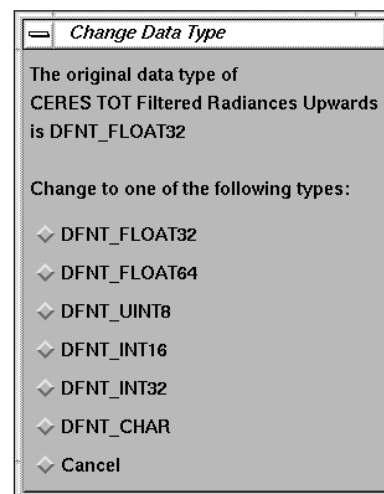


Fig. 4-111. Change Data Type Window

- (44) “Replace Data Value”: Replace a range of data values or any particular data value to an assigned value. If this option is selected, a window, as shown in Fig. 4-112, pops for entering the range of data values to be replaced and the replacement value. There are three options for selecting the ranges. They are:

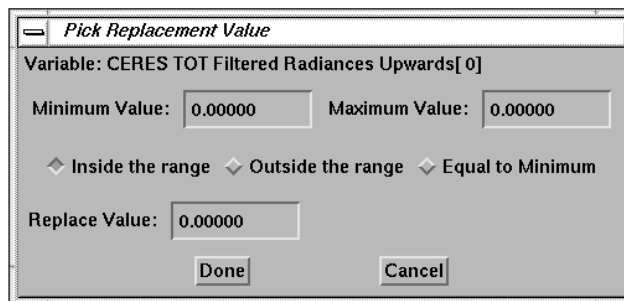


Fig. 4-112. Replace Data Value Window

- (a) “Inside the range”: Include data greater than or equal to the minimum value and less than or equal to the maximum values.
- (b) “Outside the range”: Include data less than the minimum value or greater than the maximum value.
- (c) “Equal to Minimum”: Include data equal to the minimum value.

Click the “Done” button to replace the data values of the data set which is in the Current Subsets list or click the “Cancel” button to cancel this selection.

- (45) “Scale Data Value”: Scale a data set with scale factor and offset values. When a data set is scaled using a scale factor and an offset value, the data can be stored using a smaller data type array to reduce the size of file. Therefore, some data sets in an HDF file need to be scaled back to their original values. If this option is selected, a window, as shown in Fig. 4-113, pops up to list eight equations for scaling data set.

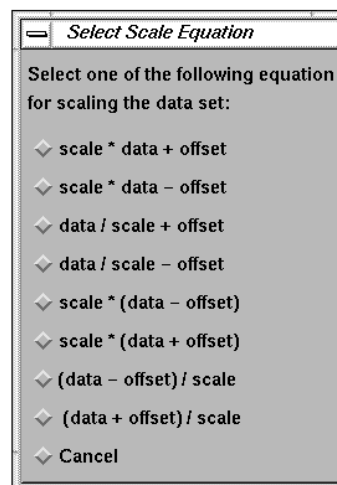


Fig. 4-113. Scale Equations Window

After selecting one of these equations, another window, as shown in Fig. 4-114, will pop up for selecting how to get the scale factor and offset values.

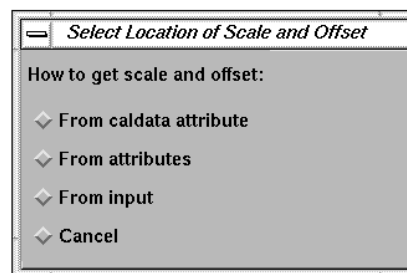


Fig. 4-114. Select Location of Scale and Offset Window

There are three options:

- (a) “From caldata attribute”: The scale factor and offset values are stored in the HDF calibration attribute for an SDS data set. This option is only valid for the fifth equation in the list. The scale factor and offset will be searched for automatically. If the calibration attribute is not found, a window, as shown in Fig. 4-115, pops up for selecting the values from other sources.

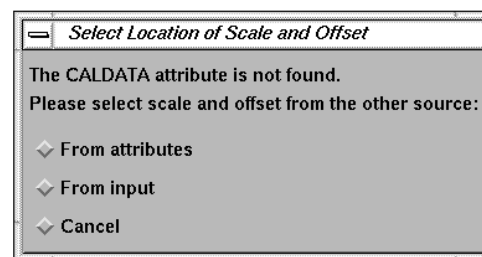


Fig. 4-115. Select Scale and Offset from Other Source Window

- (b) “From attributes”: The scale factor and offset values are obtained from the attributes of the data set. If this option is selected, two windows, as shown in Fig. 4-116, pop up with a list of the attributes for the data set from which to select the scale factor and offset values. Click the corresponding attributes, and the values of those attributes will be used to scale the data set.

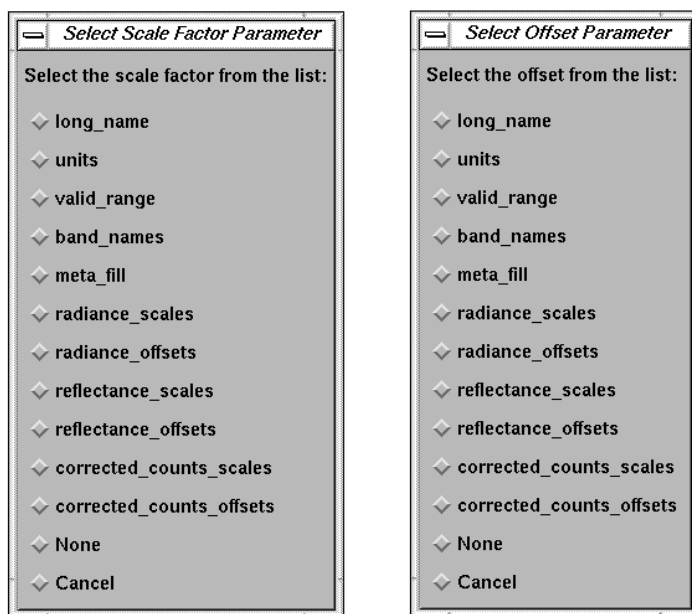


Fig. 4-116. Select Scale and Offset from Attribute Window

- (c) “From input”: The scale factor and offset values are input by the user. If this option is selected, a window, as shown [Fig. 4-117](#), pops up for entering the values of the scale factor and offset. Click the “Done” button to use the values, click the “Cancel” button to cancel this selection.

After the data values are scaled, the scaled data set will replace the data set in the Current Subsets list. No new data set is generated.

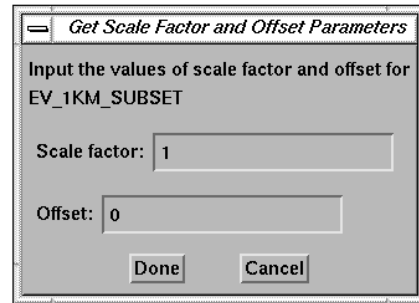


Fig. 4-117. Input Scale and Offset Window

- (46) “Remove”: Remove the name of a variable from the Current Subsets list. This option can be used to remove any subset which is no longer needed in order to reduce the number of data sets in the list. The maximum number of subsets that can be imported into the Current Subsets list at one time is twenty.

4.3 Plot Window Menu

This section describes menus, functions, and buttons in the GUI plot window (see [Fig. 4-101](#)):

- (47) “File”: This menu includes options for saving the plot in Postscript, encapsulated Postscript, GIF, PNG, or MPEG format, exporting data to a file, printing the plot, making viewgraphs, changing settings, and closing the plot window. The menu is shown in [Fig. 4-118](#).

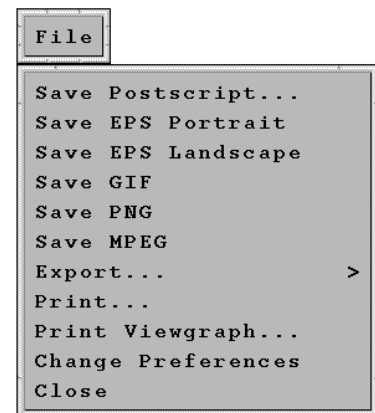
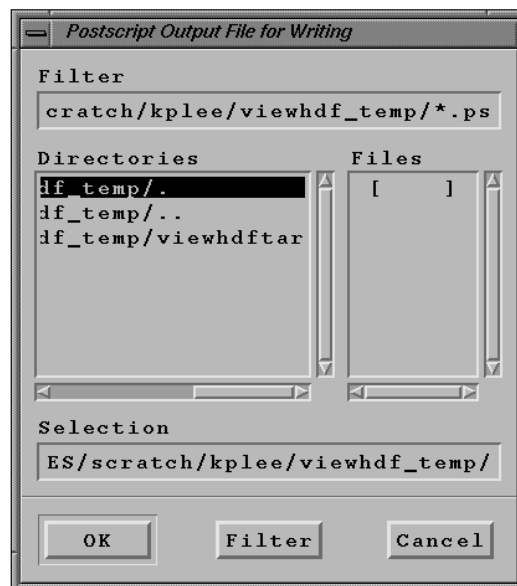


Fig. 4-118. File Menu

The options are:

- (a) “Save Postscript...”: Save the plot to a file in Postscript format. A window, as shown in Fig. 4-119, pops up for entering the filename. After entering the file name, click the “OK” button. The “Filter” button can be used to refine the list of files. To cancel this selection, click the “Cancel” button.



- (b) “Save EPS Portrait”: Save the plot to a file in encapsulated Postscript format in portrait orientation. This format is useful for importing to any document. A window similar to Fig. 4-119 pops up for entering the filename.

- (c) “Save EPS Landscape”: Same as (b) Fig. 4-119. Enter Postscript File Name Window except in landscape orientation.

- (d) “Save GIF”: Save the plot to a file with Graphics Interchange Format. A window similar to Fig. 4-119 pops up for entering the filename. Note: Since GIF file is no longer supported in IDL version 5.4 or later, this option is only valid for IDL versions earlier than 5.4. For more recent versions of IDL, the Portable Network Graphics (PNG) format can be used to save the plot, see (e).

- (e) “Save PNG”: Save the plot to a file with Portable Network Graphics (PNG) format. A window similar to Fig. 4-119 pops up for entering the filename. The PNG is designed to replace the GIF as a network format and uses a lossless compression scheme to compress images.

- (f) “Save MPEG”: Save a “Geolocated” plot to a movie file with Moving Picture Experts Group (MPEG) format. A window similar to Fig. 4-119 pops up for entering the filename. After entering the filename, click the “Done” button. Another window, as shown in Fig. 4-120, pops up for entering the number of frames for the file. The playback speed is about 30 frames per second. Click the “Done” button to start generating the file, or click the “Cancel” button to cancel this selection. Note: It will take a while to create a mpeg file.

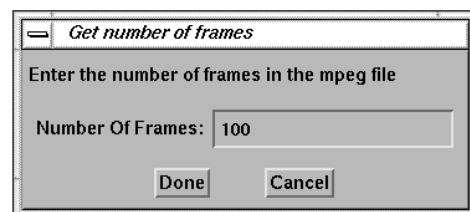


Fig. 4-120. Enter Number of Frames Window

- (g) “Export...”: Export data to a file. A window, as shown in Fig. 4-110, pops up for entering the name of the file to which the data are to be written. Click “OK” after entering the filename. There are two options:

- (i) “Without Filldata”: Does not write any data values greater than or equal to the fill data value if the fill data value is positive or any data values less than or equal to the fill data value if the fill data value is negative.
- (ii) “With Filldata”: Write all data values to a file, including fill data values.

The output format can be changed by using the “Format” option; see [item 1\(i\)](#).

- (h) “Print...”: Print the plot using any available printer. If this option is selected, the program obtains the names of available printers connected to the system by using a Unix command. A window, as shown in [Fig. 4-121](#), displays a list of the available printers. Select a printer and click the “Done” button. The print job will be sent to the queue of the selected printer. This printer is set as the default printer and it will be the first one on the printer list when this option is selected the next time. Click the “Cancel” button to cancel this selection.



Fig. 4-121. Select Printer Window

- (i) “Print Viewgraph...”: Create a viewgraph of the plot. A window, as shown in [Fig. 4-122](#), pops up for selecting the viewgraph printer. The first two entries specify CERES project-specific Tektronix Phaser 550 printers.

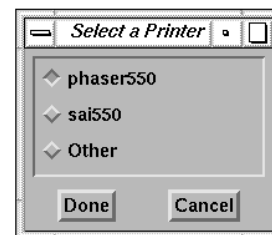


Fig. 4-122. Select Viewgraph Printer Window

If “Other” is selected, a window, as shown in [Fig. 4-123](#), will pop up for entering the command for printing a viewgraph using a particular printer. After entering the command, click the “Done” button, or the

“Cancel” button to close the window.

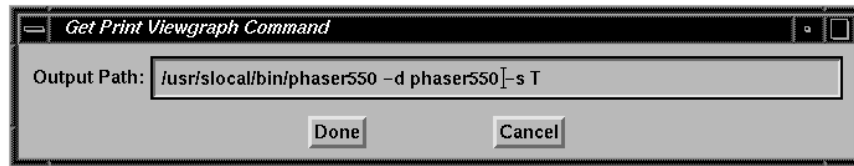


Fig. 4-123. Enter Print Viewgraph Command Window

- (j) “Change Preferences”: Change the default settings of the input and output directories, user-defined procedure directory, temporary directory, home directory, editor, open file filter, default color table, open format, and screen size. See [item 1\(i\)](#). If the screen size is changed, the graph will be replotted automatically.
 - (k) “Close”: Close the plot window.
- (48) “Graphic”: Redisplay the data with a different type graphic. This menu can be used to redisplay the data with a different style of graphic. The Graphic menu is shown in [Fig. 4-124](#). See [Section 4.2: Select Function Menu](#) for a description of these options.

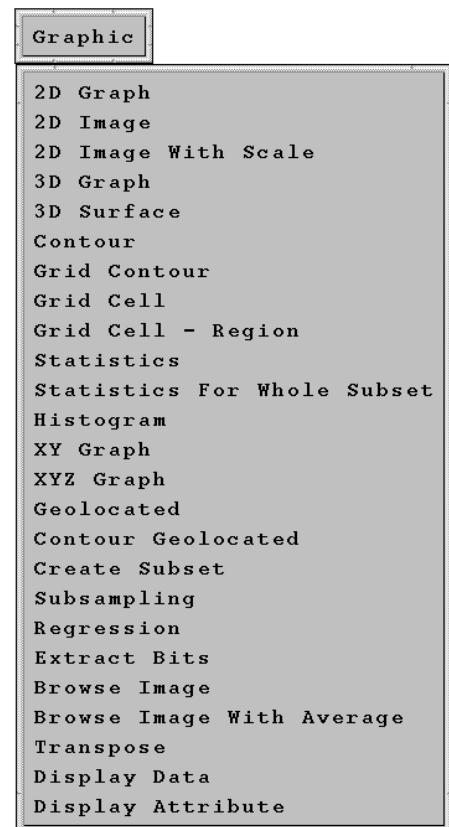


Fig. 4-124. Graphic Menu

- (49) “Subset”: Zoom, locate or view a subset of a plot. This menu allows any particular portion of the plot to be viewed. The menu is shown in [Fig. 4-125](#).

The options are:

- (a) “Zoom”: Display part of an image from the current window enlarged in a zoom window. After selecting this option, move the mouse cursor to mark the center of the zoom area. Click the left mouse button to display the zoomed image. Click the middle mouse button to display a menu of zoom factors. Click the right mouse button to exit this selection.
- (b) “Locate”: Display the current position. After selecting this option, move the cursor to the location and press the left mouse button to display the position. The position information is displayed in the window where IDL was started. Select “End Locate” to end this selection. For “Browse Image” graphic options, see [item \(35\)](#) and [item \(36\)](#), the individual profile will be displayed at that location on the other window. An example of locating an individual profile with a browse image, as shown in [Fig. 4-106](#), is given in [Fig. 4-126](#). A separated window, as shown in [Fig. 4-126](#), pops up to show the location of the X axis value and profile number. The user can change the value to display any particular location or profile number. Click the “Plot” button to display the individual profile, the “Close” button to close this window (not this selection), and the “End” button to end this selection.

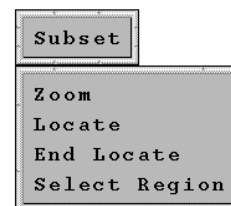


Fig. 4-125. Subset Menu

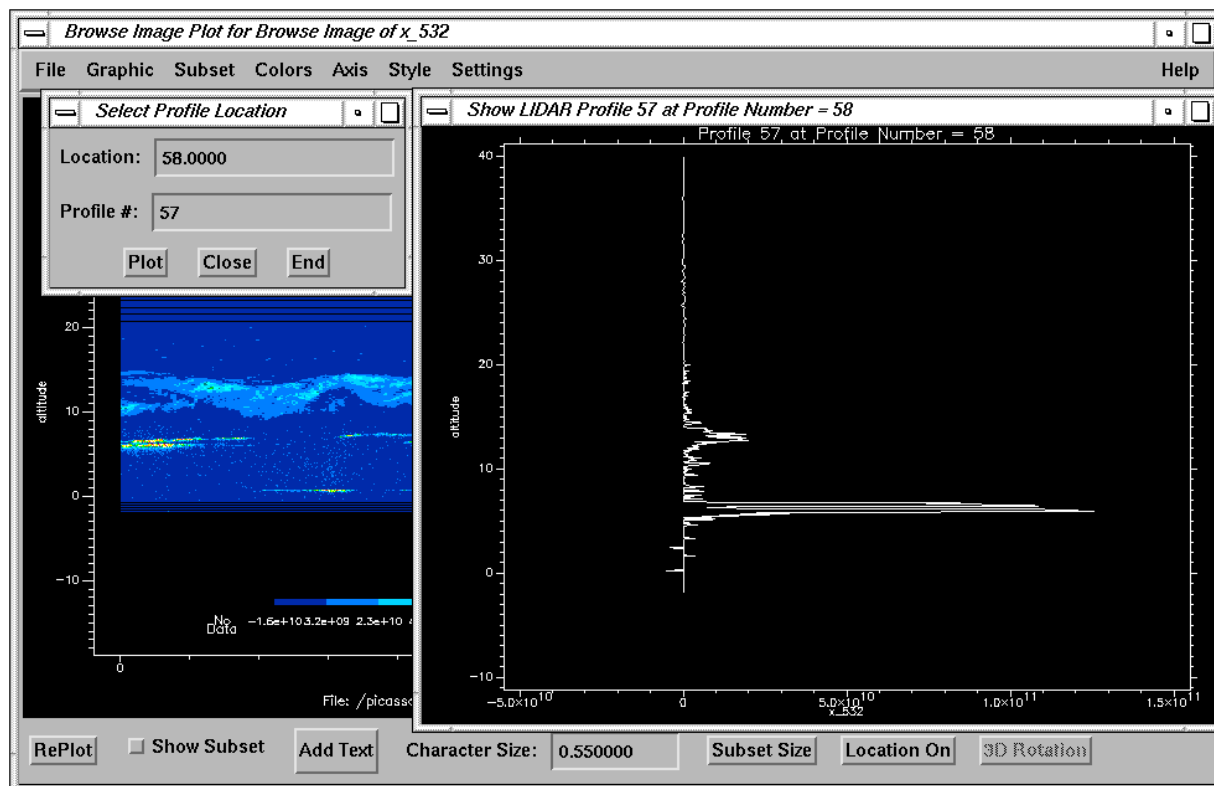


Fig. 4-126. Display individual profile from browse image plot

- (c) “End Locate”: Turn off the “Locate” option.
- (d) “Select Region”: Select a region from a geolocated plot to view. This option works only for “Geolocated” plots. After selecting this option, move the cursor to the location and click the left mouse button to mark points. Click the middle button to erase the previous point. Click the right button to close the region. An example is shown in [Fig. 4-127](#).

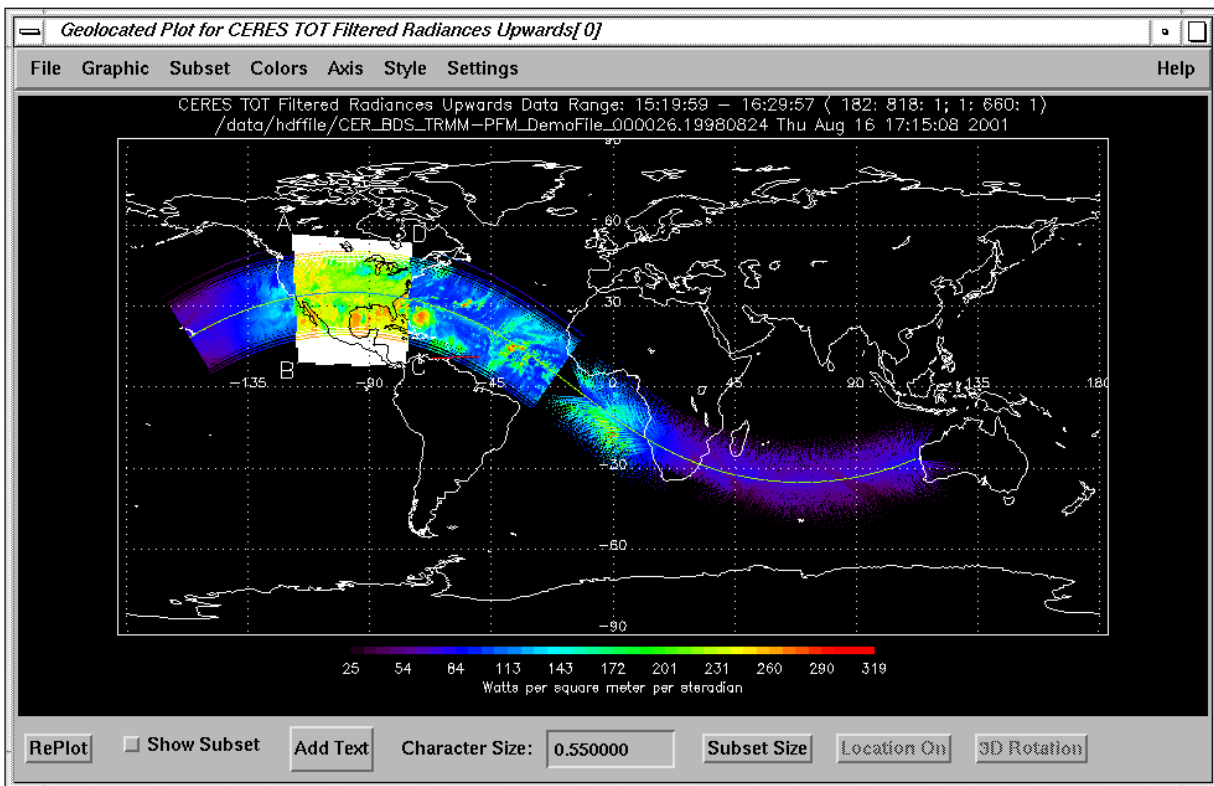


Fig. 4-127. Select Subset Region

The region is created by clicking the left mouse button at positions A, B, C, and D. Close this region by clicking right mouse button at position D.

A Subset View menu, as shown in Fig. 4-128, pops up for selecting options.

The options are:

- (i) “Table”: Display the subset data in table format in the window where IDL was started.
- (ii) “2D Plot”: Plot the subset data against the index of the data array.
- (iii) “XYZ Plot”: Plot the subset data with longitude as the X variable and latitude as the Y variable. The values of the data are scaled by color.
- (iv) “Geolocated Plot”: Plot the subset data on the selected region of the map projection. The values of the data are scaled by color.
- (v) “Done”: End the “Select Region” option.

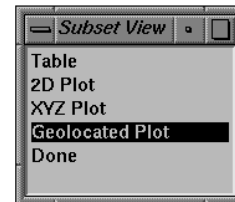


Fig. 4-128. Subset View Menu

A “Geolocated Plot” for the selected region is shown in Fig. 4-129.

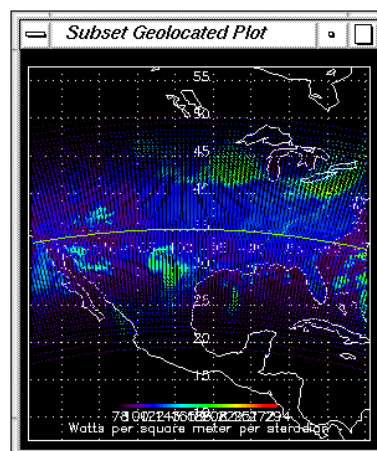


Fig. 4-129. Select Region Plot

- (50) “Colors”: Select color table, edit and save the color map, and change the background and foreground color. See item (5).
- (51) “Axis”: Set the ranges of the X, Y, and/or Z axes manually or automatically, use linear or logarithmic axes, or draw grid lines. See item (6).
- (52) “Style”: Set the line type, symbol type, and symbol size to display data. See item (7).
- (53) “Settings”: Set the X, Y, and/or Z axes ranges manually or automatically, set the display for any geolocated plot, set the longitude location of the first grid for a “Grid Cell” plot, set the display/not display option for a color bar, set the line or symbol and symbol size, fill data values, display time type, and select scale factors automatically or manually. See item (8).
- (54) “RePlot”: Replot the graph. Press this button to replot the graph with any new setting.

- (55) “Show Subset”: This option can be used to vary the subset that is displayed. After this option is selected, a window, shown in Fig. 4-130, will pop up with the “Range”,

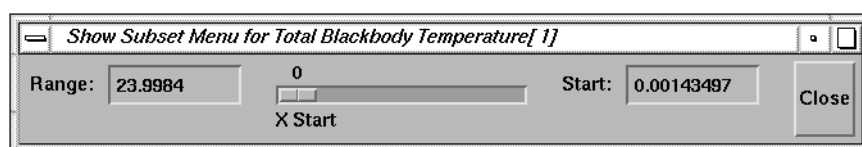


Fig. 4-130. Show Subset Menu Window

“X Start”, “Start”, and “Close” fields. These four fields are used to control the subset data:

- (a) “Range”: Set the range of the X axis. Change the range and press the Enter key to update the range. The initial value is the whole range.
- (b) “X Start”: Use the slider to set the starting value of the X axis. The ending value is equal to the starting value plus the value from “Range”.
- (c) “Start”: Set the starting value of the X axis. Specify the starting value by typing in this field. Press the Enter key to update the plot and the value of “X Start”.
- (d) “Close”: End this selection and close the Show Subset Menu window.

Both “X Start” and “Start” specify the starting value. Changing either one will change the

other value. To end this selection, click “Show Subset” again or click the “Close” button on the Show Subset Menu window. An example is shown in Fig. 4-131 in which the range is set to 1 and X starts at 0.0.

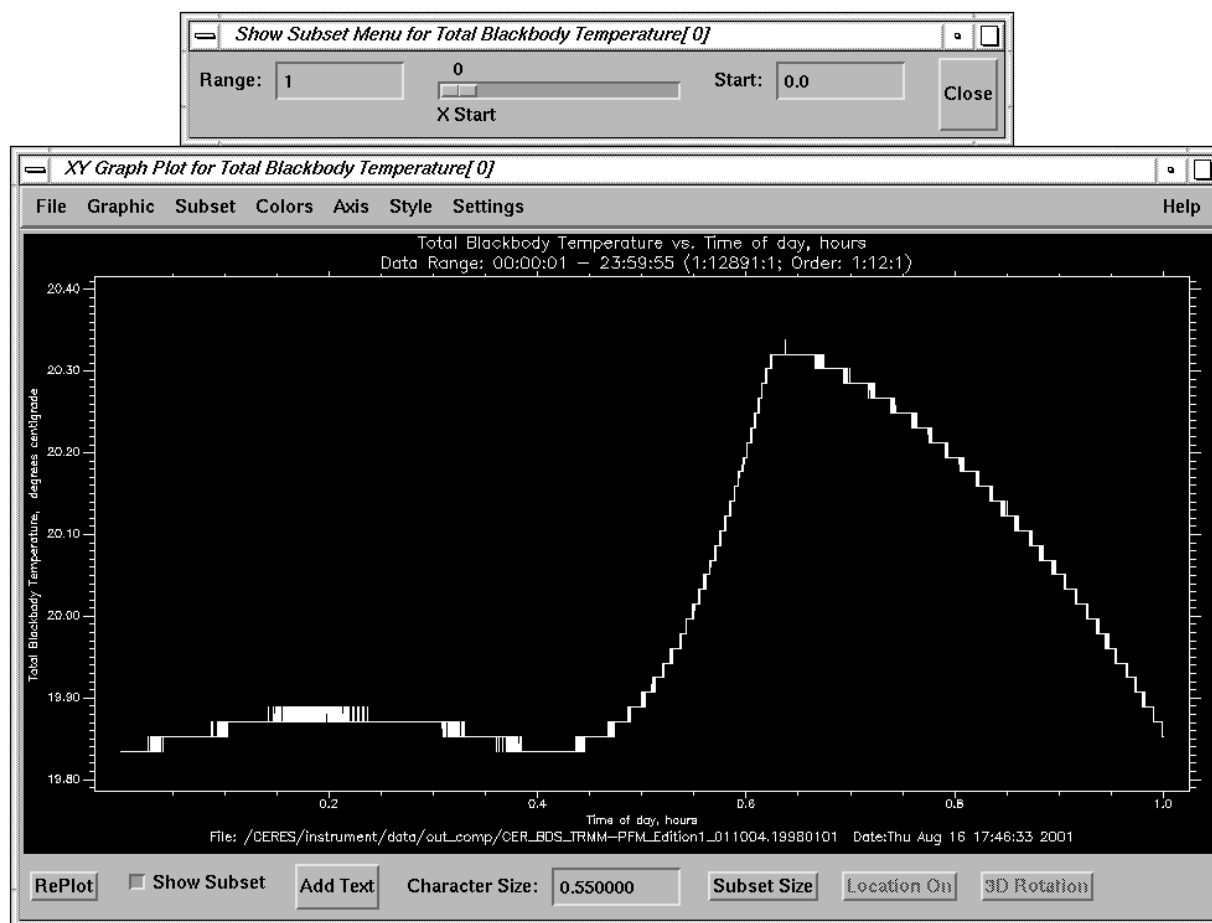


Fig. 4-131. Show Subset Plot

- (56) “Add Text”: Add text on the plot. If this option is selected, a message pops up to tell user to click the location in the plot where the text will be added. After clicking the “OK” button on the message, a window, as shown in Fig. 4-132, pops up for entering text. The following fields are used to control this selection:

Fig. 4-132. Add Text Window 1

- (a) “Add”: Add text to the plot. After this button is clicked, the text is added to the plot, and the Add Text window will display as shown in Fig. 4-133.

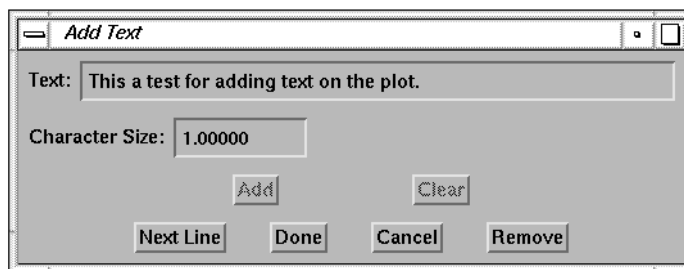


Fig. 4-133. Add Text Window 2

- (b) “Clear”: Clear the text in the text field before the “Add” button is clicked.
- (c) “Next Line”: Enter next line under the previous line. After this button is clicked, the Add Text window will be as shown in Fig. 4-132.
- (d) “Remove”: Remove the previous text line from the plot.
- (e) “Done”: Finish adding text on the plot.
- (f) “Cancel”: Remove all the text lines from this selection.
- (g) “Character Size”: Control the character size of the text. The default value is 1.0.

An example for adding text to a plot is shown in Fig. 4-134.

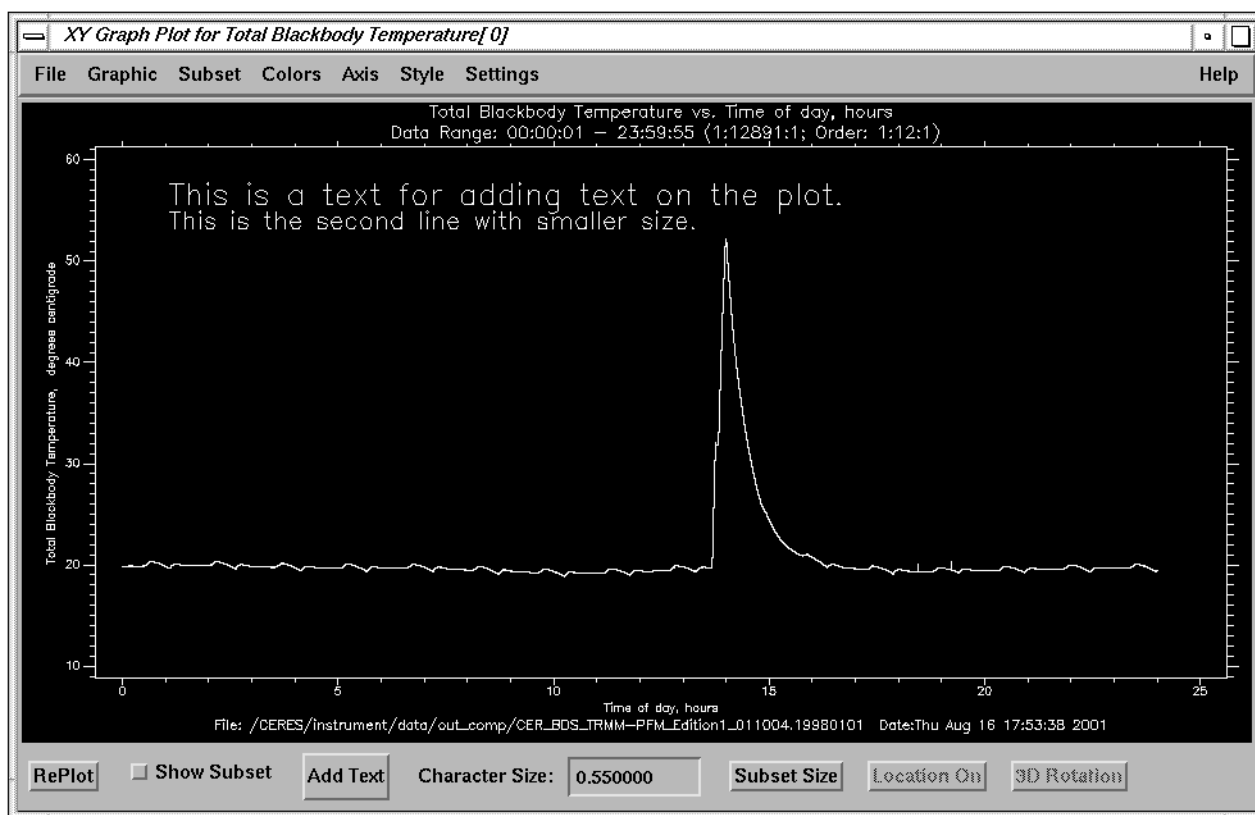


Fig. 4-134. Adding Text on a Plot

- (57) “Character Size”: Change the character size on the plot window. The default for Sun workstations is 1.0, and for SGI workstation is 0.6. Use this field to change the value of the character size and press the return key to update the value. The graph will be replotted with the new character size.

- (58) “Subset Size”: Resize the subset plot window for “Select Region” (see [item 49\(d\)](#)) with “Geolocated Plot” option. The default is three times as large in both height and width as the selected region. Click this button and a window, as shown in [Fig. 4-135](#), pops up for adjusting the size. The “Subset View Ratio” is the ratio number for enlarging the region. The “Subset View XSize” and Subset View YSize” are sizes of the subset plot window in pixels. Change either the X or Y sizes or the ratio to resize the window.

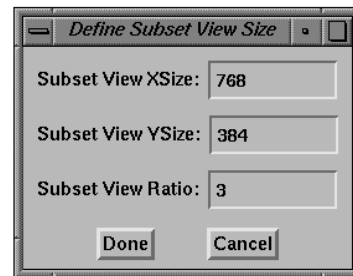


Fig. 4-135. Subset View Size Window

- (59) “Location On”: This button becomes activated if the “Locate” option in “Subset” menu is selected, see [item 49\(b\)](#). The button becomes inactivated again when the “Locate” option is turned off by selecting the “End Locate” option in the same menu, see [item 49\(c\)](#). This button can also turn off the “Locate” option.

- (60) “3D Rotation”: Set the angles of rotation for “3D Graph” and “3D Surface”. If this button is clicked, a window, as shown in [Fig. 4-136](#), pops up for entering the angles. The two angles are defined as:

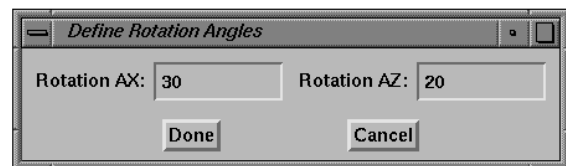


Fig. 4-136. 3D Rotation Window

- (a) “Rotation AX”: The angle of rotation, about the X axis, in degrees towards the viewer. The default is 30 degrees.
- (b) “Rotation AZ”: The counterclockwise angle of rotation about the Z axis. The default is 20 degrees.

Click the “Done” button to replot the graph or the “Cancel” button to cancel this selection.

5.0 Recognized Variable Names

In order to make some particular functions and graph styles work properly, the names of some variables were coded into the program; for example, the name of the time variable for “Range Type” ([item \(12\)](#)). This section gives the names of the CERES variables used in the code to locate those “recognized” variables. To use any of those functions, their variable names need to be set as follows:

- (1) “Time”: These variables are used for “Range Type” ([item \(12\)](#)) and “XY Graph” ([item \(27\)](#)) with the “Time” option. The variables include:
 - (a) “Julian Date and Time”: This is a two-dimensional SDS variable. The time is in Julian date format. The number of elements in the first dimension is equal to the number of records. The number of elements in the second dimension is two. The first element is the whole Julian date; the second element is the fractional Julian date. This variable is in the BDS file (See [Ref. 1](#)).
 - (b) “Time of observation”: This is a one-dimensional SDS variable. The time is in Julian date format. The value contains the Julian whole and fractional parts added together. The number of elements is equal to the number of records. This variable is in the SSF file.
 - (c) “Time of Observation”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. The field contains the Julian whole and fractional parts added together. This variable is in the IES file.
 - (d) “Time of observation”: This is a field in the Vdata named “Time of observation”. The field contains the Julian whole and fractional parts added together. This variable is in the ES8 file.
- (2) “Sample Number”: These variables are used for the “XY Graph” ([item \(27\)](#)) with the “Sample Number” option. The variables include:
 - (a) “Scan Sample Number”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. The value is the sample number in each scan. This variable is in the IES file.
 - (b) “Scan sample number”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. The value is the scan sample number. This variable is in the SSF file.
- (3) “Packet Number - Relative”: These variables are used for the “XY Graph” ([item \(27\)](#)) with “Packet Number - Relative” option. The variables include:
 - (a) “Packet Counter - Relative”: This is a field in the Vdata named “Converted Digital Data” or “Converted Instrument Status Data”. The value is the packet number relative to the first packet number of the day. This variable is in the BDS file.

- (b) “Packet Number”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. The value is the packet number relative to the first packet number of the day. This variable is in the IES file.
- (4) “Packet Number - Absolute”: These variables are used for the “XY Graph” (item 27) with “Packet Number - Absolute” option. The variables include:
 - (a) “Packet Counter - Absolute”: This is a field in the Vdata named “Converted Digital Data” or “Converted Instrument Status Data”. The value is the absolute packet number of the CERES instrument data. This variable is in the BDS file.
 - (b) “Absolute Packet Number”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. The value is the absolute packet number of CERES instrument data. This variable is in the IES file.
 - (c) “Packet number”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. The value is the absolute packet number. This variable is in the SSF file.
- (5) “Geolocated Parameters”: These variables are used for the “Geolocated” (item 29) option in the Graph Menu. The geolocated parameters include the longitude and latitude/colatitude of the data, satellite, and Sun. The variable unit is expressed in degrees. These variables include:
 - (a) “Longitude of CERES FOV at Surface”: This is a two-dimensional SDS variable. The number of elements in the first dimension is equal to the number of records. The number of elements in the second dimension is equal to the number of samples in each record. This variable is in the BDS file.
 - (b) “Longitude of CERES FOV at TOA”: This is a two-dimensional SDS variable. The format is the same as “Longitude of CERES FOV at Surface”. This variable is in the ES8 files.
 - (c) “Colatitude of CERES FOV at Surface”: This is a two-dimensional SDS variable. The format is the same as “Longitude of CERES FOV at Surface”. This variable is in the BDS file.
 - (d) “Colatitude of CERES FOV at TOA”: This is a two-dimensional SDS variable. The format is the same as “Longitude of CERES FOV at Surface”. This variable is in the ES8 files.
 - (e) “Longitude of Subsatellite Point at Surface at record start”: This is a field in the Vdata named “Satellite-Celestial Data” in the BDS file.
 - (f) “Colatitude of Subsatellite Point at Surface at record start”: This is a field in the Vdata named “Satellite-Celestial Data” in the BDS file.
 - (g) “Longitude of Subsolar Point at Surface”: This is a field in the Vdata named “Satellite-Celestial Data” in the BDS file.

- (h) “Colatitude of Subsolar Point at Surface”: This is a field in the Vdata named “Satellite-Celestial Data” in the BDS file.
- (i) “Longitude of satellite nadir at record start”: This is a field in the Vdata named “Longitude of satellite nadir at record start” in the ES8 file.
- (j) “Colatitude of satellite nadir at record start”: This is a field in the Vdata named “Colatitude of satellite nadir at record start” in the ES8 file.
- (k) “Longitude of Sun at observation”: This is a field in the Vdata named “Longitude of Sun at observation” in the ES8 file.
- (l) “Colatitude of Sun at observation”: This is a field in the Vdata named “Colatitude of Sun at observation” in the ES8 file.
- (m) “Longitude of CERES FOV at surface”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (n) “Colatitude of CERES FOV at surface”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (o) “Longitude of subsatellite point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (p) “Colatitude of subsatellite point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (q) “Longitude of subsolar point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (r) “Colatitude of subsolar point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.
- (s) “Longitude of CERES FOV at Surface”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.
- (t) “Colatitude of CERES FOV at Surface”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.
- (u) “Longitude of Subsatellite Point at Surface at Observation”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.
- (v) “Colatitude of Subsatellite Point at Surface at Observation”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.

- (w) “Longitude of Subsolar Point at Surface at Observation”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.
- (x) “Colatitude of Subsolar Point at Surface at Observation”: This is a field in the Vdata named “IES Hour***” where “***” is the hour number from 00 to 23. This variable is in the IES file.
- (y) “Longitude” or “longitude”: This is a SDS variable for the longitude of the FOV. The number of elements is equal to the number of elements in the data set.
- (z) “Latitude” or “latitude”: This is a SDS variable for the latitude of the FOV. The number of elements is equal to the number of elements in the data set.

6.0 Configuration File

A configuration file stores some settings for the current session. When the user calls up the next session of `view_hdf`, these settings are read and they replace the default settings. The configuration file is stored under the user's home directory with the name `username_view_hdf_config_file`. This file is written in ASCII format and includes the items listed in [Table 6-1](#). The user can change the settings with any editor.

Table 6-1. Configuration File Settings

Configuration Item	Description	Default
<code>view_hdf</code> Configuration file for: <code>username</code>	User configuration file identification	
<code>info.precision</code>	format for exporting data;	e18.9
<code>info.color_bar</code>	draw color bar; 1 on, 0 off.	1
<code>info.color_table</code>	number of default color table.	13
<code>info.open_path</code>	path for open HDF file.	local directory
<code>info.ascii_file.open_path</code>	path for open ASCII file.	local directory
<code>info.open_filter</code>	filter for open file.	""
<code>info.ps_path</code>	path for saving Postscript output file.	local directory
<code>info.ps_file</code>	Postscript output file name.	plot.ps
<code>info.eps_path</code>	path for saving encapsulated Postscript output file.	local directory
<code>info.eps_file</code>	encapsulated Postscript output file name.	plot.eps
<code>info.export_path</code>	path for saving export data file.	local directory
<code>info.export_file</code>	export data file name.	export.dat
<code>info.hdf_path</code>	path for saving HDF data file.	local directory
<code>info.hdf_filename</code>	output HDF data file.	export.hdf
<code>info.list_path</code>	path for save export list data file.	local directory
<code>info.output_path</code>	path for listing files in OUTPUT field.	local directory
<code>info.userdefine.old_path</code>	path for last open user defined module.	local directory
<code>info.userdefine.file</code>	file name for last open user defined module.	
<code>info.userdefine.path</code>	path for user defined module.	
<code>info.userdefine.name</code>	module name of user defined module.	
<code>info.userdefine.num_para</code>	number of arguments for user defined module.	
<code>info.filter</code>	filter for listing file in OUTPUT field.	"*.dat"
<code>info.gif_path</code>	path for saving GIF output file.	local directory
<code>info.gif_file</code>	GIF output file name.	plot.gif
<code>info.stats_path</code>	path for saving statistics result file.	local directory
<code>info.stats_file</code>	statistics result file name.	stats.dat
<code>nfo.temp_dir</code>	path for saving temporary file.	/CERES/scratch/idtemp
<code>info.home_path</code>	path for home directory	from "HOME" environment variable
<code>info.eps_type</code>	type of encapsulated Postscript output file; 0 portrait, 1 landscape.	
<code>info.editor_type</code>	type of editor; 0 vi, 1 emacs, 2 ieditor.	0
<code>info.editor</code>	name of editor for "Other" option.	vi
<code>info.printcommand</code>	command for print viewgraph for "Other" option.	
<code>info.style.linetype</code>	line type for displaying data points.	0 for solid line
<code>info.style.symbol</code>	symbol type for displaying data points.	0 for no symbol
<code>info.style.usersym</code>	user defined type symbol.	
<code>info.style.symbolsize</code>	symbol size for marking data.	1

Table 6-1. Configuration File Settings

Configuration Item	Description	Default
info.style.symbolline	connect symbols with line; 0 no line, 1 with line.	0
info.style.grid	draw grid lines on major tick marks; 0 no grid lines, 1 with grid lines.	0
info.char.size	character size.	0.6 for (SGI); 1 for (Sun)
info.greenwich.greenloca	longitude location at the center of map projection.	0 degree
info.greenwich.lat_loc	latitude location at the center of map projection.	0 degree
info.greenwich.projection	type of map projection.	0 for cylindrical
info.greenwich.label	label the longitudes and latitudes; 1 on, 0 off.	1
info.greenwich.n_level	number of levels for "With Level" option on.	10
info.greenwich.expand	Expand the geolocated data; 1 expand, 0 not expand.	1
info.greenwich.satellite	plot satellite position; 1 on, 0 off.	1
info.greenwich.sun	plot Sun position; 1 on, 0 off.	1
info.greenwich.smooth	option for contour geolocated graphic option.	0 for with smoothing
info.greenwich.n_x_grid	number of grids in longitude location for contour geolocated graphic option.	360
info.greenwich.n_y_grid	number of grids in latitude location for contour geolocated graphic option.	180
info.greenwich.continents	redraw the continents boundaries; 1 on, 0 off.	0
info.greenwich.mlinethick	line thickness for drawing the boundaries of continents.	1
info.grid_start	the longitude location of first grid data; value greater than 360 means auto.	500
info.time_type.old	time type; 0 hours, 1 minutes, 2 seconds.	2
info.time_type.new	time type; 0 hours, 1 minutes, 2 seconds.	2
info.screen.pick	type of screen size; 0 1024x600, 1 1152x614, 2 other.	0 for Sun workstation, 1 for SGI
nfo.screen.xsize	size of screen in X direction.	
info.screen.ysize	size of screen in Y direction.	
info.current_printer	default printer.	
info.top_color	maximum number of colors.	200
background_color	background color.	0 for black
foreground_color	foreground color.	199
info.previous_file.max	maximum number for storing previous open files	5
info.previous_file.store	file name for previous open file	

7.0 Examples

This section gives examples for making some special plots using view_hdf. The first example is a plot of total filtered radiances for nighttime from a BDS file on a map projection. The procedure is:

- (1) Open a BDS file with “File” --> “Open HDF Files”.
- (2) Import “CERES TOT Filtered Radiances Upwards” for the first 550 records.
- (3) Import “CERES Solar Zenith at TOA - Geocentric” for the first 600 records.
- (4) Click “CERES TOT Filtered Radiances Upwards[0]” from the Current Subsets list. The “Select Function” menu pops up.
- (5) Select “Create Subset” and click the “Done” button. The “Pick Additional Criterion” window pops up.
- (6) Select “CERES Solar Zenith at TOA - Geocentric[1]” as parameter and enter minimum value as 110 and maximum value as 180. Note: nighttime is defined here as solar zenith angle greater than 110 degrees. Click the “Done” button.
- (7) Name the new subset data as “TOT Filtered Radiances for Night Time” and click the “Done” button. This data set is total filtered radiances for nighttime.
- (8) Click on the new data set in the Current Subsets list; the “Select Function” menu pops up again.
- (9) Select “Geolocated” and click the “Done” button.

A plot for total filtered radiances for nighttime appears on the screen as shown in Fig. 7-1. The criterion is shown on the left bottom corner.

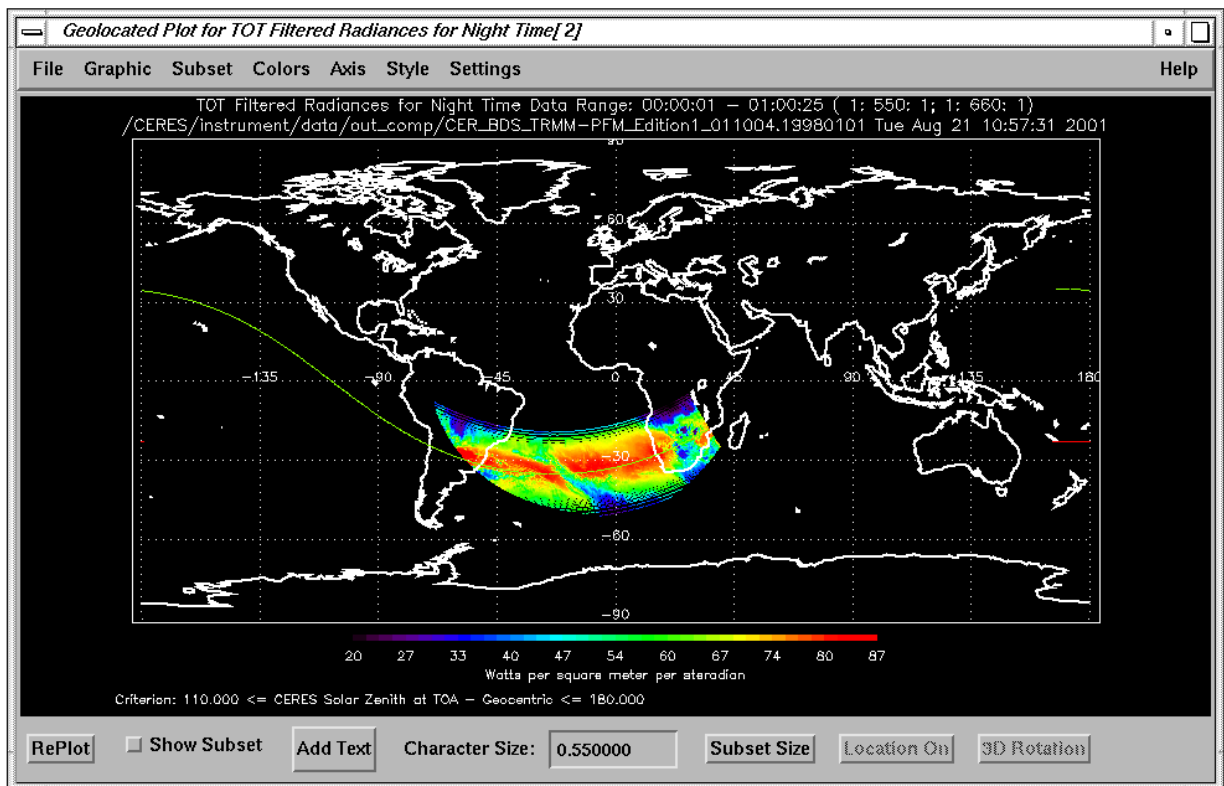


Fig. 7-1. Total Filtered Radiances for Night Time

The second example is a plot of scene ID from an ES8 file on a map projection. The values for total filtered radiances are continuous; however, the values of scene ID are discrete. It is better to use discrete color levels to represent the values of scene ID. The procedure is:

- (1) Use “File” --> “Change Preferences” to change the “Open File Filter” to “CER_ES8_*”.
- (2) Open an ES8 file with “File” --> “Open HDF file”.
- (3) Import “ERBE scene identification at observation” data set from 20:00:00 to 21:35:00.
- (4) Select “Settings” --> “Color Bar” --> “Discrete” to display the data with discrete color mapping. The “Number Of Discrete Intervals” field becomes activated.
- (5) Enter “13” in “Number Of Discrete Intervals” and click the “Done” button. The value of scene ID ranges from 1 to 13. Each level is for one scene ID number.
- (6) Use “Axis” --> “Manual” --> “Z Only” to set the scene ID range. The “Define Z Axis” window pops up. Enter the 0 for “Z Start”, and 13 for “Z End” and click the “Done” button.
- (7) Use “Colors” --> “Select Colors” to select the “13 Scene ID Levels” color table. This entry is at the end of the list.
- (8) Click on the scene ID data from the Current Subsets list and select the “Geolocated” option from the popped up “Select Function”. Click the “Done” button.

A plot for scene ID with 13 levels will be shown on the screen as in [Fig. 7-2](#).

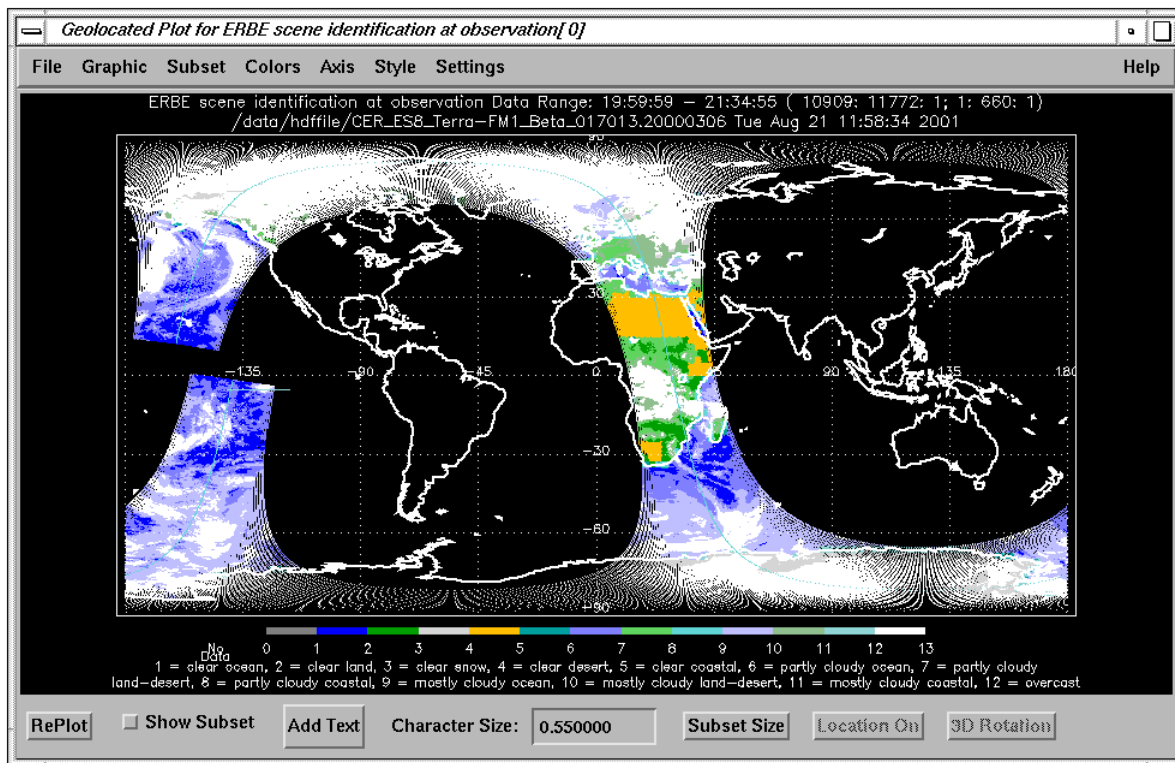


Fig. 7-2. Scene ID with 13 Levels

To change back to continuous color, the procedure is:

- (1) Select “Settings” --> “Color Bar” --> “Continuous” to switch back to display of the data with a continuous color mapping.

- (2) Select “Axis” --> “Auto” to use automatically set axes ranges.
- (3) Select “Colors” --> “Select Colors” to select any continuous color table; for example, “Rainbow + white”

The third example shows how to use “Extract Bits” option to extract some specific contiguous bits from an integer variable. The “Radiance and Mode Flags” in a CERES SSF file contain the filtered radiance quality flags and instrument mode flags. The bits from 10 to 13 represent the “Elevation scan plane”. The definition of the bit patterns is given in the SSF Collection Guide ([Ref. 5](#)). The procedure is:

- (1) Use “File” --> “Change Preferences” to change the “Open File Filter” to “CER_SSF_*”.
- (2) Open a SSF file with “File” --> “Open HDF File”.
- (3) Import “Radiance and Mode Flags” in the Current Subset list.
- (4) Click on the variable from the Current Subset list and select the “Extract Bits” option from the popped up “Select Function”. Click the “Done” button.
- (5) The Extract Bits window, as shown in [Fig. 7-3](#), pops up for entering the starting location bit and the number of bits to extract. Enter 10 for Start Bit field and 4 for Number of Bits field and click the “Done” button.

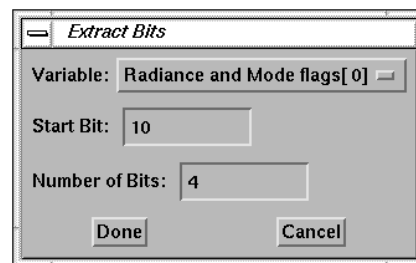


Fig. 7-3. Extract Bits Window

- (6) Name the new variable “Elevation scan plane flag” in the Get Variable Name window, and click the “Done” button. The new variable is put into the Current Subset list as shown in [Fig. 7-4](#).

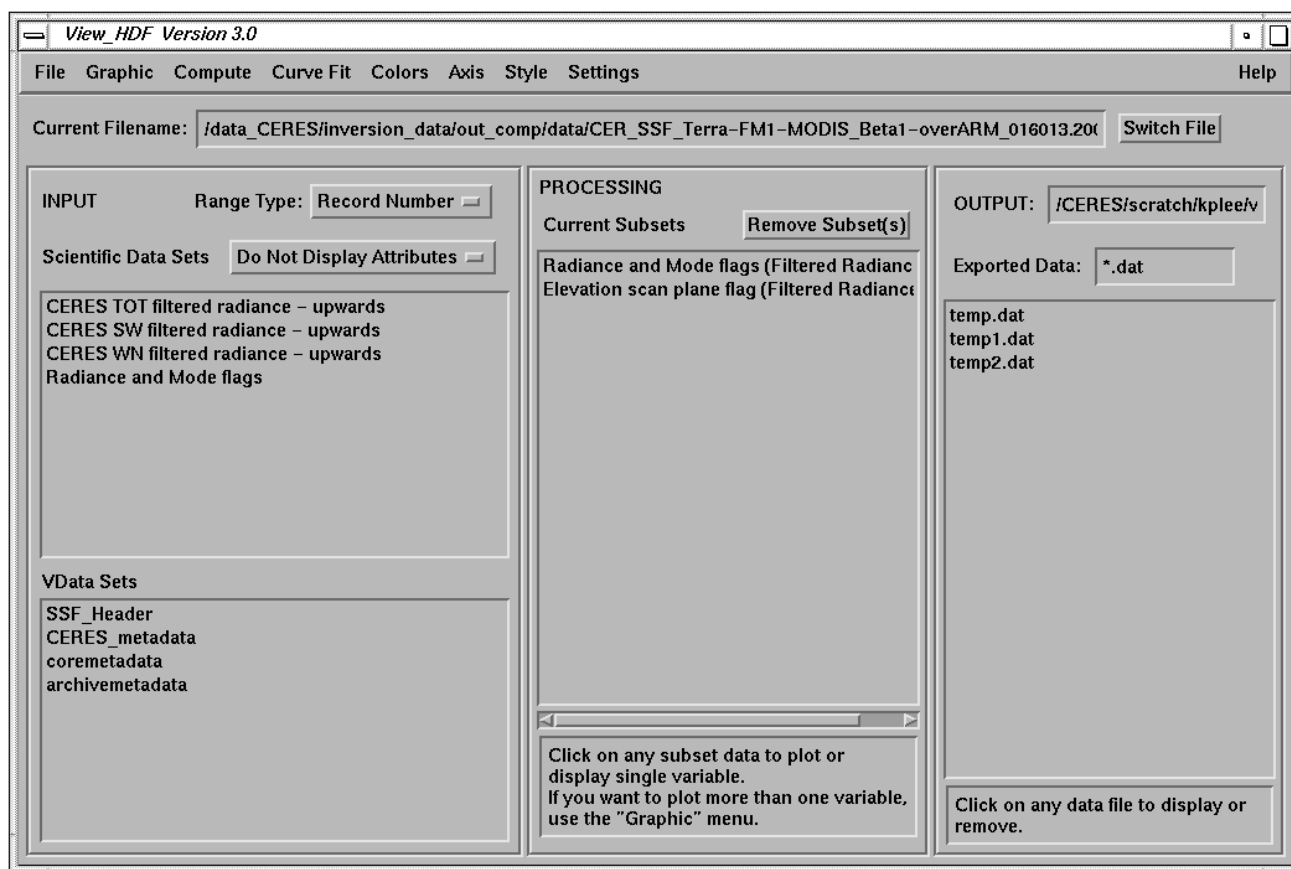


Fig. 7-4. Extract Elevation Scan Plane Flag

A 2D plot of the Elevation Scan Plane Flag is shown in Fig. 7-5. The value of zero represents the elevation scan profile in Normal Earth Scan mode.

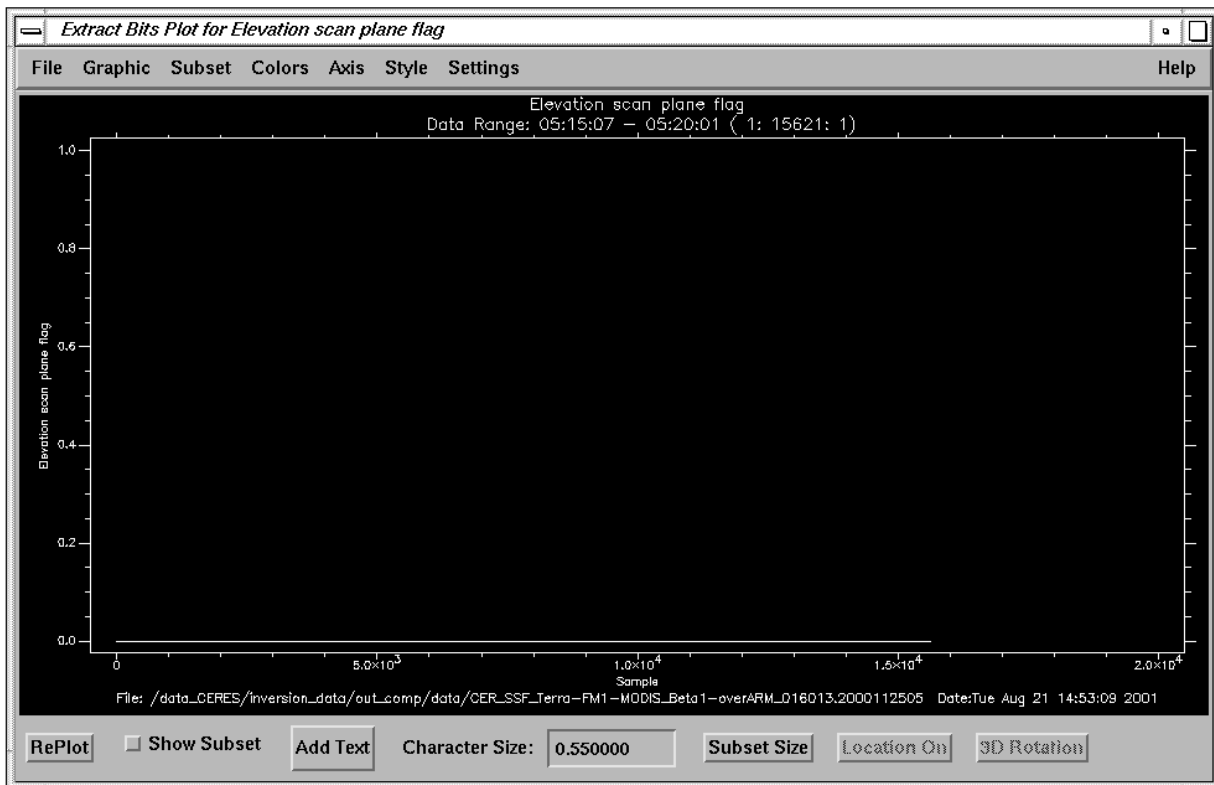


Fig. 7-5. 2D Plot for Elevation Scan Plane Flag

The fourth example shows how to use the “Create an HDF File” and “Add Data to an HDF File” options to combine data sets from two different files. The “Geolocated” graphic option plots only one variable at a time. If a user wants to plot two data sets from two different files on a map projection, the two data sets are written into one HDF file, which is then opened for plotting. The procedure is:

- (1) Open a BDS file for the TRMM instrument with “File” --> “Open HDF Files”.
- (2) Import “CERES TOT Filtered Radiances Upwards”, “Colatitude of CERES FOV at Surface”, and “Longitude of CERES FOV at Surface” variables into Current Subsets list.
- (3) Select “File” --> “Create an HDF File” option.
- (4) Enter the filename “TRMM_Terra.hdf” in the select file window and click “OK” button.
- (5) Click the “All Variables” button to select all the variables from the Current Subsets list to be written into the HDF file.
- (6) After all selected data written to the file, open the second file, a BDS file for the Terra instrument, with “File” --> “Open HDF Files”.
- (7) Import the same three variables into the Current Subsets list.
- (8) Select “File” --> “Add Data to an HDF File” option.
- (9) Select the same HDF file, TRMM_Terra.hdf, from the select file window.
- (10) Click the “Selected Variables” button and select the three variables imported from the second file from the “Select Output Variables” window to add into the file.

- (11) Since the data sets have the same names as the data sets already in the file, the Write HDF Question window pops up. Select the “Append data to the data set” to append the new data sets at the end of each corresponding data set. The window will pop up three times, one for each data set.
- (12) Open the newly created HDF file, TRMM_Terra.hdf, with “File” --> “Open HDF Files”.
- (13) Import “CERES TOT Filtered Radiances Upwards” into the Current Subsets list.
- (14) Click the variable in the Current Subsets list and select the “Geolocated” option from the popped up “Select Function” window. Click the “Done” button.

The result plot is shown in Fig. 7-6.

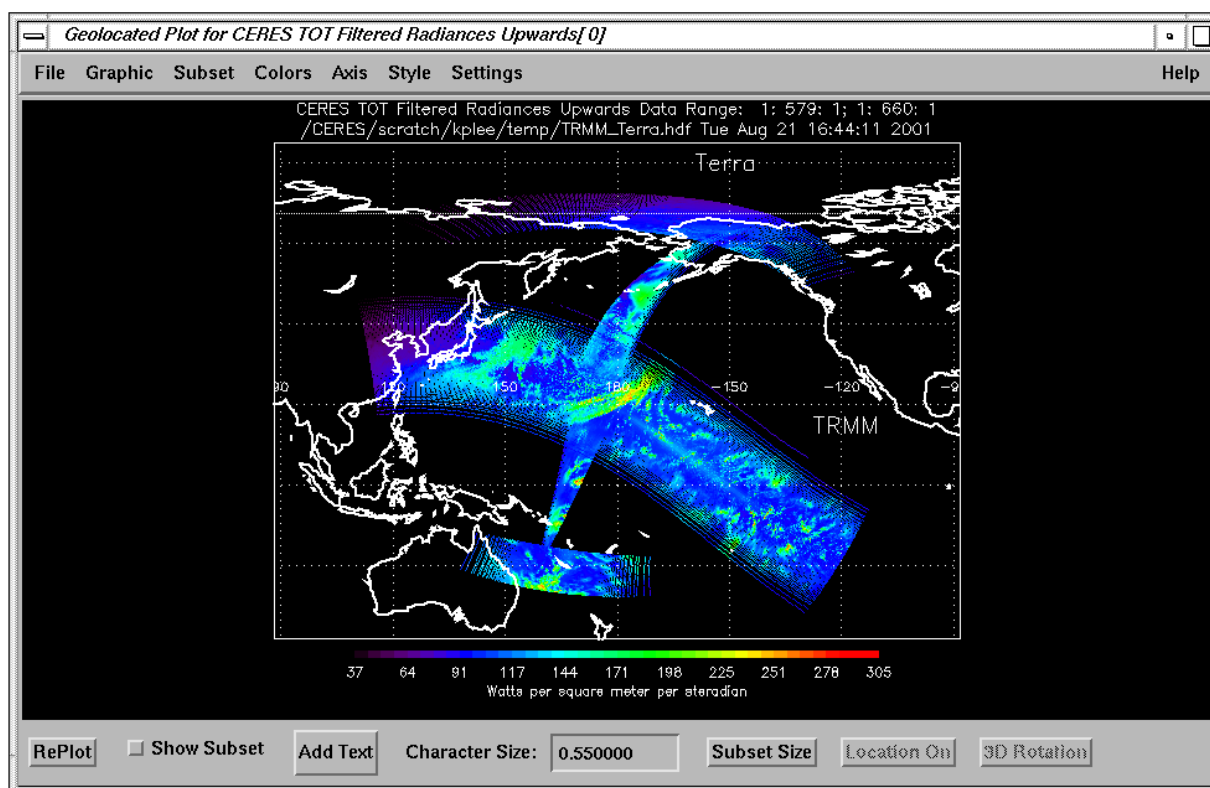


Fig. 7-6. Geolocated plot for two data sets from two different files

The last example describes how to stop a running process. The view_hdf tool does not have a “Stop” button to terminate a long process; however, the following procedure can be used:

1. Move the cursor to the window in which IDL was started.
2. Press the <CTRL> C to interrupt the process. The IDL prompt will appear. Note: if the IDL prompt does not appear, move the cursor to the main menu window or plot window then move it back to the window where IDL was started. If the IDL prompt does not appear, it is because an external C function is running. The IDL prompt will appear after the function finishes.
3. Type **.continue** to resume the process, or

4. Type **return** or **retall** to stop the process. The “retall” command returns to the top of main program. Type **xmanager** at the IDL prompt to continue using the view_hdf tool, or type **exit** to exit IDL.

If an error message “Can’t continue from this point” is given, type **xmanager** at the IDL prompt to continue or **exit** to exit IDL.

8.0 References

1. Cloud's and the Earth's Radiant Energy System (CERES) Bi-directional Scans (BDS) Collection Document, Draft; Release 3, Version 2, June 2000.
{URL: http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html}
2. Cloud's and the Earth's Radiant Energy System (CERES) ES-8 Collection Document, Draft; Release 3, Version 3, June 2001.
{URL: http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html}
3. Cloud's and the Earth's Radiant Energy System (CERES) Data Management System Data Products Catalog, Release 3, Version 2, August 2001.
{URL = http://earth-www.larc.nasa.gov/ceresdoc/DPC/DPC_current/DPC.html}
4. HDF User's Guide, Version 4.0, February 1996 (from NCSA).
{URL = <http://eosweb/HBDOCS/hdf.html>}
5. Cloud's and the Earth's Radiant Energy System (CERES) Single Scanner Footprint, TOA and Surface Fluxes and Clouds (SSF) Collection Document, Draft; Release 1, Version 5, July 2001.
{URL = http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html}

9.0 List of Acronyms

ASCII	American Standard Code for Information Interchange
ASDC	Atmospheric Sciences Data Center
BDS	Bidirectional Scan Science Product
CERES	Clouds and the Earth's Radiant Energy System
CRS	Clouds and Radiative Swath Science Product
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ES4	ERBE-like S4 Monthly Science Product
ES8	ERBE-like S8 Instantaneous Science Product
FORTTRAN	Formula Translation
GIF	Graphical Interchange Format
GUI	Graphical User Interface
HDF	Hierarchical Data Format
IDL	Interactive Data Language
IES	Instrument Earth Scans Science Product
LaRC	Langley Research Center
LW	Longwave
MPEG	Moving Picture Experts Group
NASA	National Aeronautics and Space Administration
PNG	Portable Network Graphics
SARB	Surface and Atmospheric Radiation Budget
SDS	Scientific Data Set
SSF	Single Satellite CERES Footprint TOA and Surface Fluxes, Clouds Science Product
SW	Shortwave
TOT	Total
TRMM	Tropical Rainfall Measuring Mission
URL	Uniform Resource Locator
WN	Window

10.0 Data Center/Data Access Information

1. Contacts

Langley Atmospheric Sciences Data Center
Science, Users, and Data Services
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Mail Stop 157D
2 South Wright Street
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FAX: (757) 864-8807
E-mail: larc@eos.nasa.gov
URL: <http://eosweb.larc.nasa.gov>

2. Ordering Data

Several media types are supported by the Langley ASDC CERES Web Ordering Tool. Data can be downloaded from the Web or via FTP. Alternatively, data can be ordered on media tapes. The media tapes supported are 4mm 2Gb (90m), 8mm 2Gb (8200), 8mm 5Gb (8500), and 8mm 7Gb (8500c).

Data ordered via the Web or via FTP can be downloaded in either Uncompressed mode or in UNIX Compressed mode. Data written to media tape (in either Uncompressed mode or in UNIX Compressed mode) is in UNIX TAR format. To assist the Langley ASDC in providing the best service to the scientific community, a notification is requested if these data are transmitted to other researchers.

3. Citation

Please provide a reference to the following paper when scientific results are published using the CERES BDS TRMM data:

"Wielicki, B. A.; Barkstrom, B.R.; Harrison, E. F.; Lee III, R.B.; Smith, G.L.; and Cooper, J.E., 1996: Clouds and the Earth's Radiant Energy System (CERES): An Earth Observing System Experiment, Bull. Amer. Meteor. Soc., 77, 853-868."

When Langley ASDC data are used in a publication, the following acknowledgment is requested to be included:

"These data were obtained from the NASA Langley Research Center Atmospheric Sciences Data Center."

The Langley Data Center requests a reprint of any published papers or reports or a brief description of other uses (e.g. posters, oral presentation) which cite the use of data the Langley ASDC has distributed. This will help the data center to determine the use of data distributed, which is helpful in optimizing product development. It also helps the data

center to keep product-related references current.

4. Document Information

Table 10-1. view_hdf Document Information

Document Item	Version	Date
Document Creation	Version 1.0	December 1998
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